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**Master Negative
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PSt SNPaAg239

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Report of the Department of Fisheries of the Commonwealth of
Pennsylvania, 1906/1907
MNS# PSt SNPaAg239.1

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Report of the Department of Fisheries of the Commonwealth of
Pennsylvania, 1907/1908
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- 9) Pennsylvania Dept. of Fisheries**
Report of the Department of Fisheries of the Commonwealth of
Pennsylvania, 1914/1915
MNS# PSt SNPaAg239.9

Author: Pennsylvania Dept. of Fisheries

**Title: Report of the Department of Fisheries of the
Commonwealth of Pennsylvania**

Place of Publication: Harrisburg

Copyright Date: 1906/1907

Master Negative Storage Number: MNS# PSt SNPaAg239.1

<1918811> * Form:serial 2 Input:BAP Edit:FMD

008 ENT: 960418 TYP: d DT1: 1904 DT2: 1917 FRE: a LAN: eng

010 sn 86035214

037 PSt SNPaAg238.4-240.2 \$bPreservation Office, The Pennsylvania State University, Pattee Library, University Park, PA 16802-1805

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090 09 SH11 \$b.P47 \$l+(date) \$cax \$s+U1903/04-U1916/17

090 20 Microfilm D344 reel 238.4-240.2 \$l+(date) \$cmc+(service copy, print master, archival master) \$s+U1903/04-U1916/17

110 1 Pennsylvania. \$bDept. of Fisheries.

245 10 Report of the Department of Fisheries of the Commonwealth of Pennsylvania.

246 1 \$iVol. for 1907/08-1916/17 have title: Report of the Department of Fisheries of the Commonwealth of Pennsylvania

260 [Harrisburg \$bThe Dept.] \$bWM. Stanley Ray, state printer of Pennsylvania \$c1905-1918.

300 v. \$bill. \$c23-25 cm.

310 Annual

362 0 1903/04-1916/17.

515 Suspended Nov. 30, 1917-May 31, 1922.

515 Vol. for 1903-04 covers the period from June 1, 1903 to Nov. 30, 1904; report year ends Nov. 30.

533 Microfilm \$m1903/04-1916/17 \$bUniversity Park, Pa. : \$cPennsylvania State University \$d1998 \$e3 microfilm reels ; 35 mm. \$f(USAIN state and local literature preservation project. Pennsylvania) \$f(Pennsylvania agricultural literature on microfilm)

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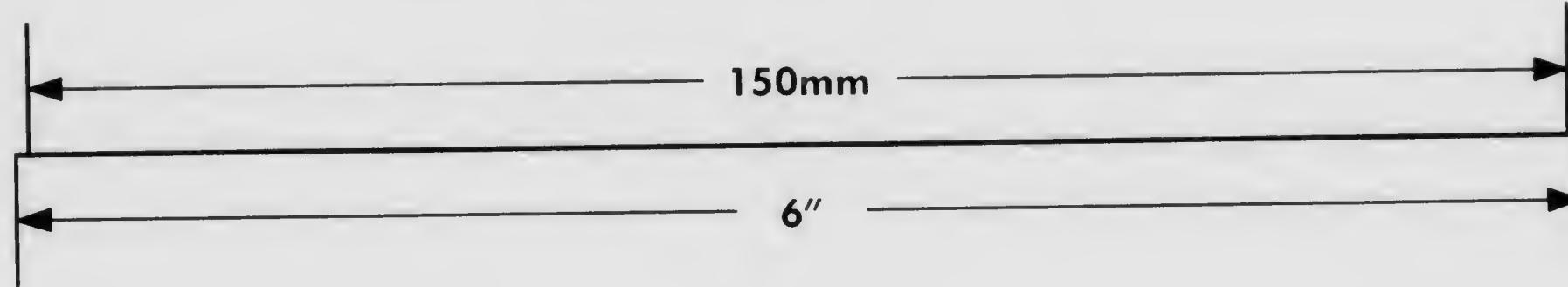
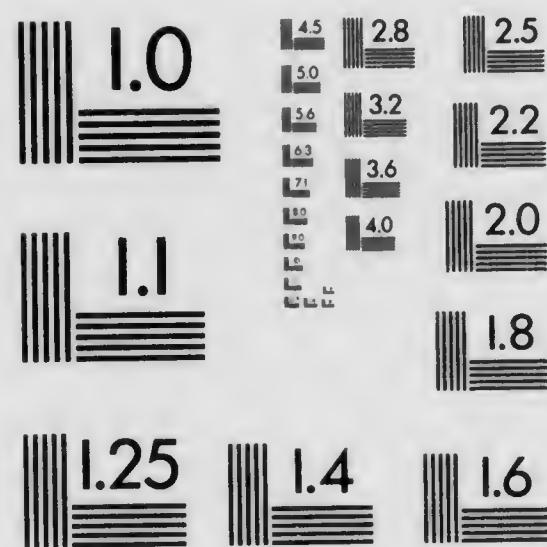
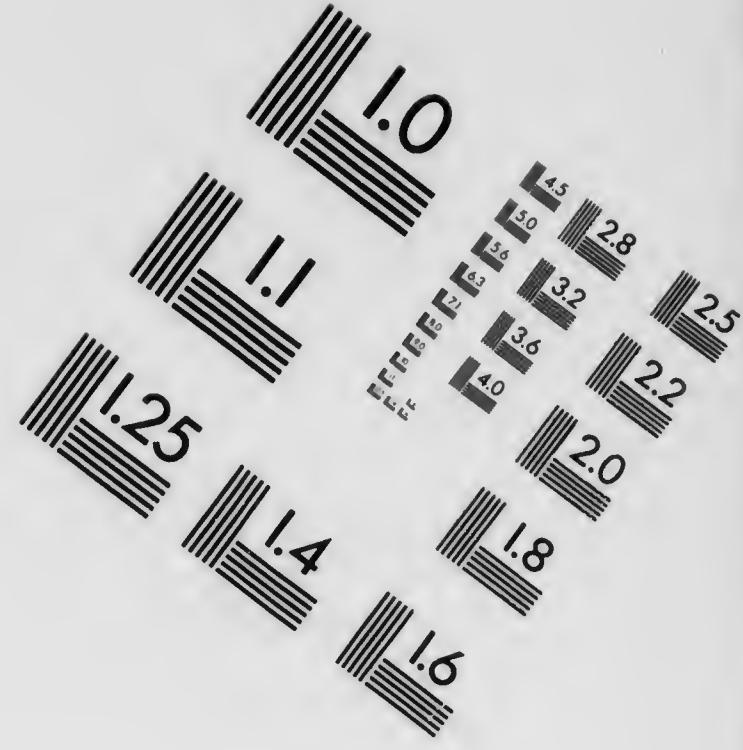
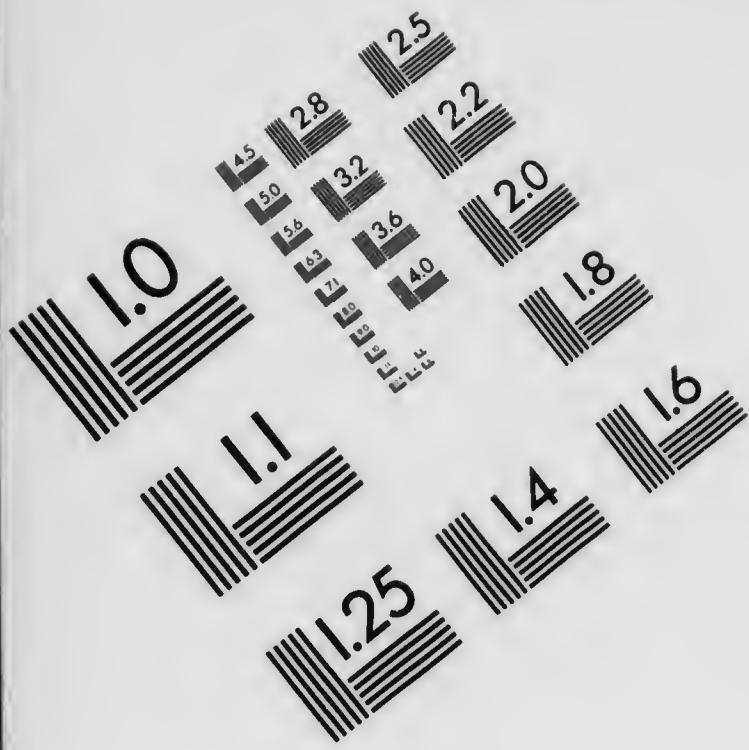
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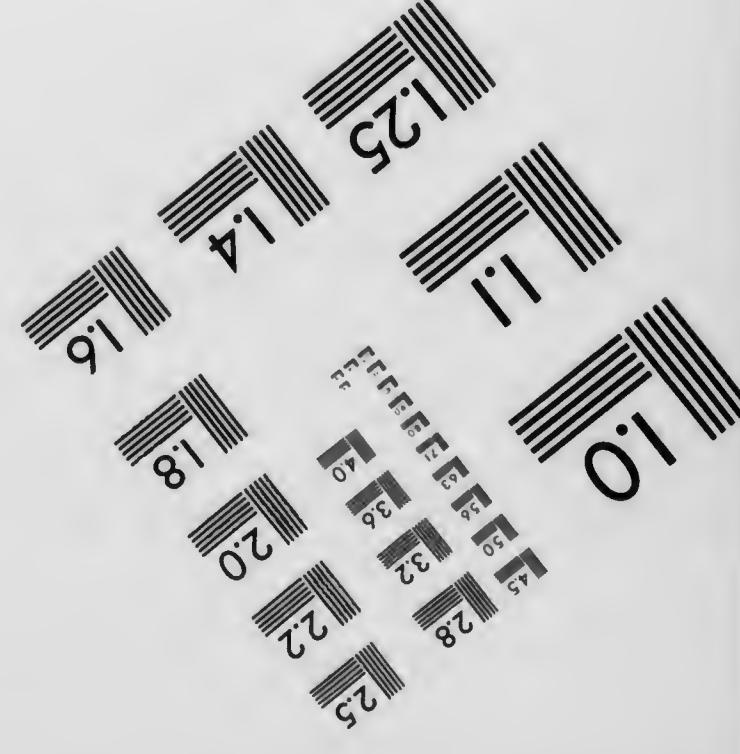
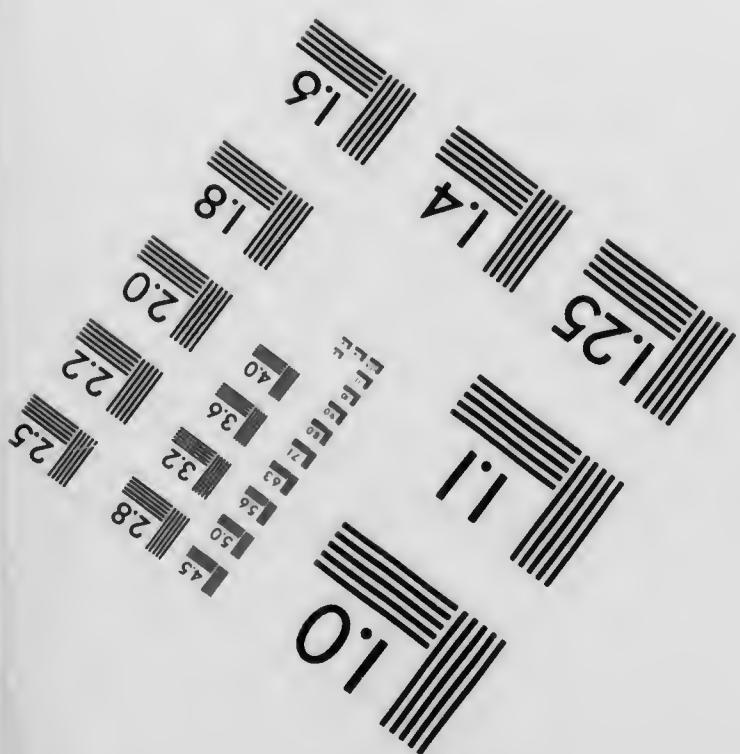
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1906/1907

REPORT

OF THE

DEPARTMENT OF FISHERIES

OF THE

COMMONWEALTH OF PENNSYLVANIA,

FROM

DECEMBER 1, 1906, TO NOVEMBER 30, 1907.

HARRISBURG, PA.:
HARRISBURG PUBLISHING CO., STATE PRINTER.
1908.

DEPARTMENT OF FISHERIES OF THE COMMON-
WEALTH OF PENNSYLVANIA.

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COMMISSIONER OF FISHERIES.

WILLIAM E. MEEHAN, Office, Harrisburg.

BOARD OF FISHERY COMMISSIONERS.

WILLIAM E. MEEHAN, President.
JOHN HAMBERGER, Erie.
HENRY C. COX, Wellsboro.
ANDREW R. WHITAKER, Phoenixville.
W. A. LEISENRING, Mauch Chunk.

SUPERINTENDENTS OF HATCHERIES.

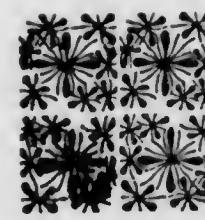
Corry Hatchery No. 1, William Buller, Corry, Pa.
Erie Hatchery No. 2, Philip H. Hartman, Erie.
Bellefonte Hatchery No. 3, Howard M. Buller, Bellefonte, R. F. D.
No. 2. Assistant Superintendent, B. O. Webster, Bellefonte, R. F. D.
No. 2.
Wayne County Hatchery No. 4, Nathan R. Buller, Pleasant Mount.
Torresdale Hatchery No. 5, Jerry R. Berkous, Holmesburg, Philadelphia.
Erie Auxiliary No. 6, (Union City Hatchery), Abraham G. Buller,
Union City.
Spruce Creek Hatchery No. 7, Wm. F. Haas, Spruce Creek.
Crawford Hatchery No. 8, W. H. Safford, Conneaut Lake.

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IN MEMORIAM.

Walter L. Powell, who died Sunday, March 24, 1907, was for several years a member of the State Fish Commission and for a period its Treasurer. He was 54 years old, and was born at Mount Holly, New Jersey, where, in his early manhood, he was for a while a clerk in a grocery store. From Mount Holly he went to Philadelphia where he became a salesman for a Philadelphia grocery firm. About 23 years ago he located in Harrisburg, and was one of the founders of the Harrisburg Grocery and Provision Company, and was also one of the founders of the Harrisburg Board of Trade and was its first President. Mr. Powell was an enthusiastic angler and when the Board of Fish Commission was re-organized under Governor Beaver's administration, he was appointed a Commissioner with Henry C. Ford, Henry C. Demuth, George H. Welshons and Louis Streuber. Mr. Powell was made the Treasurer of the Board and held that office until his retirement under Governor Pattison's second administration.

LETTER OF TRANSMITTAL.

Honorable Edwin S. Stuart, Governor of Pennsylvania, Harrisburg,
Pa.:

Sir: I have the honor to herewith present the report of the Department of Fisheries for the year beginning December 1, 1906, and ending November 30, 1907, the fourth report since my incumbency as Commissioner of Fisheries.

The growth of the work of the Department during the year was phenomenal, greatly exceeding that of the previous year, as you will observe by the summary which is herewith appended for your convenience. The total output from the hatcheries from December 1, 1906, to November 30, 1907, was 663,387,524 fish, frogs and aquatic plants, as against 397,663,790 the previous year.

Three dwelling houses were provided for Superintendents and Assistants on hatchery grounds in order to have those officers continually on the spot and save the cost of watchmen. Two barns were built for live stock and work rooms. Two hatching houses, one 100 feet long by 40 feet wide, and another 60 feet long by 30 feet wide were erected, and a third the size of the latter started. The jar capacity of a third house was increased which will enable a marked expansion in the output of fish in the near future.

Three large ponds averaging over half an acre each for bass and sunfish, 21 ponds for trout and 9 ponds for bass fry were built, and two large ponds for yellow perch began the year before were completed. More than a dozen ponds for trout at the Corry Hatchery, which had fallen into decay, were rebuilt.

A contract was awarded for the building of a steam tug 70 feet long with a speed of 17 miles an hour for the use of the Department on Lake Erie.

Marked progress was made towards placing bass culture on as secure a foundation as trout culture. There was a decided expansion in field work, thus saving from wasteful loss hundreds of millions wild fish eggs, notably white fish, lake herring, wall-eyed pike, pickerel, yellow perch and shad, owing to a specific appropriation therefor, made at the last session of the Legislature.

The Department began experimental work artificially propagating fresh water pearl mussels, receiving three species from the United States Government, two of which yield pearls, and two, the shells of which are valuable for making pearl buttons. Complete success was achieved in experimental work with the propagation of the sucker. Unqualified success was also made with the propagation of sunfish.

Reports from all over the State indicate that game fishing has materially improved through the heavy stocking by the State in the last three years. Reports also indicate that the Department's efforts to re-establish yellow perch and pickerel in suitable waters

throughout the state are bearing good fruit. Reports from Lake Erie show beyond reasonable doubt the re-establishment of the white fish industry in the waters under the jurisdiction of Pennsylvania.

Reports also indicate a slight improvement in the shad industry of the Delaware.

Through the encouragement of the Department one new commercial trout plant was started, and a second projected.

The warden service as re-organized with such good effect that a marked increase in respect for the fish laws was noted at the end of six months. The total number of arrests for the year was 536, with 477 convictions, and 59 acquittals. Only 22 convicted persons went to jail in lieu of payment of fines.

The cordial relations existing between the Department of Fisheries and the United States Bureau of Fisheries and Fish Commissions of other states remain as strong as heretofore, and last spring New Jersey co-operated with Pennsylvania in shad propagation on the Delaware river. The co-operative work between the United States Bureau of Fisheries and Pennsylvania in gathering wild eggs on Lake Erie, which has prevailed for several years, was notably expanded during 1907.

Respectfully,

W. E. MEEHAN,
Commissioner of Fisheries.

REPORT
OF THE
BOARD OF FISHERY COMMISSION.

Harrisburg, Pa., December 1, 1907.

To the Honorable Edwin S. Stuart, Governor of the Commonwealth of Pennsylvania:

Sir: The Board of Fishery Commission of the Department of Fisheries has the honor and pleasure to submit to you its fourth annual report. In its presentation of the work of the Department of Fisheries for 1906, made to the Honorable Samuel W. Pennypacker, it said:

"The Commissioner of Fisheries and the Board of Fishery Commission have endeavored to demonstrate that the Legislature did wisely in its session in 1903 in creating the Department of Fisheries. In reviewing the work which has been done we feel that we need not be ashamed. We have not yet accomplished all that we set out to do, but each year's work has shown progress to a marked degree, both in fish culture and in fish protection."

We are gratified to be able to say that the work for 1907 shows as marked an increase as 1906 did over 1905 and preceding years. In fish culture the output aggregated the great total of 663,295,524, or about two-thirds greater than the output of 1906, and within 135,339,124 of the combined outputs of 1902, 1903, 1904, 1905 and 1906. The following is the table of the output from 1902 to 1906, inclusive:

1902,	109,945,233
1903,	68,516,650
1904,	78,985,867
1905,	143,550,108
1906,	397,636,790
Total,	798,634,648

That the increase is healthy and not abnormal is shown by the fact that the output remains this year as last proportionately the same as that of the United States Bureau of Fisheries, namely, one-fifth, the Government work being in the aggregate about 3,000,-

000,000 for the year 1907. As in former years, the relationship between the United States Bureau of Fisheries and the Department of Fisheries of Pennsylvania has been very close and the great output from the State hatcheries was greatly assisted by the United States Government.

The lake trout eggs, cut throat trout eggs and a portion of the rainbow trout eggs were contributed by the United States. The white fish, lake herring and wall-eyed pike eggs were gathered by the United States Bureau of Fisheries in Lake Erie under an agreement, Pennsylvania paying its share of the cost. This agreement has been in force for a number of years and was brought about by Commissioner Meehan during the existence of the Fish Commission. A number of years ago Pennsylvania, Ohio and the United States gathered the eggs of these species of fish each through their own subordinates.

The result was confusion, unfortunate rivalry and high priced eggs. In order to put an end to these undesirable conditions, the Commissioner suggested to United States Commissioner Bowers that the United States Bureau take in hand the sole work of gathering the eggs in Ohio waters where the spawning fish were most abundant; that the eggs be divided among the hatcheries of Pennsylvania, Ohio and the United States on Lake Erie in proportion to their capacity and that the two states and the United States pay the pro rata cost of gathering. This was agreed to and as it worked well the agreement has been continued yearly since.

The State of New York also contributed towards the output with 5,000,000 smelt eggs in exchange for which the Department sent New York state a supply of trout fingerlings with which to stock the breeding ponds of the New York State Hatchery at Cold Spring Harbor, Long Island. The New York Commissioner had also directed a quantity of muscallonge eggs to be sent from the New York State Hatchery at Bemis Point, but through a misunderstanding they were not sent by the Superintendent of that Station. These eggs it was intended to hatch and plant in Conneaut Lake for the purpose of increasing the number of that great fish in that lake for breeding purposes.

Several of the commercial trout hatcheries in Pennsylvania also gave their surplus eggs to the Department, the only condition being that we should send skilled spawn takers to assist in gathering them. Several million eggs were thus obtained from the Penn Forest Brook Trout Company, the Crystal Spring Brook Trout Company, the Weissport Hatchery and from the Blooming Grove Hunting and Fishing Club, the largest quantity coming from the first named and the smallest from the last.

The Commissioner of Fisheries feels that while these eggs are freely given the state in the manner described, it would be better if they were obtained in some other manner. He states in his report that the cost of sending men to these hatcheries and gathering the eggs amounts to about fifteen cents a thousand eggs. He believes it would be better in every way for the Legislature to make a special appropriation for the purchase of surplus eggs from the hatcheries not exceeding a certain stipulated price. While this price would be under the regular market rate for green eggs, he

holds that it should be acceptable since it would only be the surplus eggs, and that it would be an encouragement to the commercial hatcheries to keep up their plants to the highest point of efficiency, knowing that all their eggs, which ought to be taken, for the benefit of the fish, would be utilized. It would be of advantage also to the state since it would not render it necessary to take the most skillful spawn takers from the state hatcheries at a time when they could profitably be used at home.

We agree fully with his conclusions and recommendations. The eggs which were a free gift, have been an important addition to the State's output, and we cannot thank the owners of the commercial hatcheries too heartily, and we are in hearty accord with the Commissioner in the efforts he made to secure those eggs.

The take of white fish and lake herring eggs in the fall of 1906 was about the same as in former years, but there was a heavy gain in the take of wall-eyed pike eggs. More eggs were handled than in any time in the history of fish cultural work in Pennsylvania. The number exceeded 200,000,000. As the eggs of these fish hatch very rapidly, it is difficult to fill the Erie hatchery with its nearly 500 jars, but not only was this station crowded with eggs, but overflows were sent to Torresdale and to Wayne.

There was also a marked increase in the number of yellow perch and pickerel eggs gathered and hatched. There is no species of fish so easy to handle as the eggs of the yellow perch and pickerel and they are also easily obtained. An output of each is only limited by the money available to pay the cost of gathering and the capacity of the hatcheries.

From reports received, the plantings of wall-eyed pike, perch and pickerel have been showing remarkable results in the interior waters and some real astonishing statements have been received showing the increase of yellow perch. The character of the persons making the reports are, however, so high as to leave no doubt whatever as to their truthfulness and we feel that the outputs of all three species, especially of yellow perch and pickerel, should be trebled or quadrupled at the earliest possible moment.

The Department made elaborate preparations during 1907 to greatly increase the output in 1908, the Legislature approving by making appropriations towards that object. A battery containing 350 jars was erected at the Crawford hatchery at Conneaut Lake, a worn out battery at the Erie hatchery torn out and replaced by a new one with an increased capacity of 20 jars, a hatching house at Corry remodelled to give an increased capacity for trout, and a new hatchery house, with a capacity of 4,000,000 trout, built at Spruce Creek Station, Huntingdon county, are among some of the preparations made for a greatly increased output in 1908.

The various hatching batteries in the State hatcheries now contain nearly 1,600 jars, having an aggregate capacity of over 6,000 quarts of eggs at one time. This number it is intended to increase during the year 1908, if possible. Fourteen new trout ponds for breeding purposes were built at the Bellefonte hatchery, three at Spruce Creek and four at Wayne. All of the old ponds near the entrance of the Corry hatchery were also overhauled and rebuilt,

permitting a marked increase in the number of brood fish at that station.

A large pond for bass was also built at the Crawford hatchery, together with two fry ponds. A large yellow perch pond was completed at that station. This pond will have a capacity of at least 10,000 brood perch. A number of bass fry ponds were built at Union City and a large yellow perch pond completed. A pond for sunfish covering about a quarter of an acre was built at Torresdale and also a commodious fry pond.

Among the items in the appropriation bill designed to assist the Department to increase its output of fish was a sum for the building of a steam tug for Lake Erie. A contract was awarded an Erie ship building concern for a tug 70 feet long and capable of navigating any part of Lake Erie in any kind of weather. When this boat is completed and in commission, it is the intention of the Department to gather lake fish eggs from Canadian waters, and negotiations are now under way towards securing them through the assistance, if possible, of the Canadian Government. The boat is to be completed by the first of June, 1908.

There was a marked improvement in the shad fisheries on the Delaware river in 1907. More fish were caught, according to unofficial reports, than in any year since 1900. They also brought a much higher price, and it is said that nearly every shore and gill net fisherman made money. It was a curious fact, however, as well as disappointing, that a majority of females which entered the river were not in a condition to yield their eggs to the spawntakers. A great majority were very hard and there was an unusual number that only lacked 24 hours of being ripe.

Owing to the increased number of fish and closer attention being paid and also a greater interest among the fishermen, the Department was enabled to gather many more eggs than for several years previous, the number reaching nearly 6,000,000, allowing an output of over 5,000,000. The shad fisheries of the Delaware river have been giving the Board of Fishery Commission some concern. For several years the weather has been unfavorable for a large run and in the face of this, no skill, no effort on the part of the fish culturists can avail. With the tremendous mortality among very young and old shad, such a condition must mean a diminution in the number of fish, hence when unfavorable weather conditions do prevail the industry must be below normal and make the restoration of the river difficult.

Many years ago the United States Government attempted to hold shad in cribs until the eggs were ripe, but the experiments were failures. It was found possible to hold the males. This latter fact has given the Commissioner of Fisheries encouragement to believe that there must be some way of ripening the females in cribs. He holds that it is inconceivable that one sex can be successfully carried in this manner and not the other. He will therefore conduct a series of experiments for the Department next spring on the Delaware river.

The black bass culture was a curious mixture of success and failure. There are ponds for the rearing of fish of this species at the Crawford hatchery, Conneaut Lake, another at Union City, Erie

county, another at Spruce Creek, Huntingdon county, a fourth at Torresdale hatchery, Philadelphia, and a fifth at the Wayne hatchery, Pleasant Mount, Wayne county. The one at Torresdale is for large mouth bass exclusively. The others contain only breeding small mouth bass.

There was found no difficulty whatever in inducing the parent bass in every one of the ponds to build nests and hatch the eggs. With the exception of the Crawford hatchery, the troubles began after the fry had lost their sacs and the little creatures began to feed. At Crawford hatchery a sudden and severe frost in June lowered the temperature of the water to 44 and killed the entire first crop of eggs and fry, estimated at about 50,000. A second crop produced from fish gathered in the spring from Lake Erie produced about 40,000 fry.

By augmenting the natural food in fry pond with artificial food, the bass at the end of 35 days had attained a length of from an inch and a half to two inches, with a minimum amount of cannibalism so that 32,000 were shipped. Under the circumstances the output from this hatchery therefore was a brilliant success, especially in view of the fact that there were only about 50 breed fish or about 35 females.

At the Union City hatchery the brood pond was much larger and there was a greater number of brood fish and it is estimated that about 200,000 young fish were hatched. Fifty thousand advanced fry were planted from this hatchery in Lake Erie, and at the age of 35 days, 22,650 were shipped to applicants. The remainder were destroyed by cannibalism before shipment could be made.

At Spruce Creek about 25,000 were hatched, but about a week after the fry were placed in the one fry pond available, algae appeared and before it could be disposed of and the young fish gotten out, all but 2,200 were destroyed through cannibalism.

The hatch at Wayne County was a total loss together with many thousand collected by field work. Algae and a drought, according to the Superintendent of the Station, prevented any attempt to fill the applications. The total output therefore of black bass was less than 100,000. These figures might seem to some, and to this Board indeed, four years ago, would have seemed gratifyingly large, but under the circumstances, and in this we have the concurrence of the Commissioner himself, the output was disappointingly small. We feel, and the Commissioner of Fisheries feels that in the future every Superintendent should strain every nerve to get the fish out to applicants with the same promptness that was exhibited by the Superintendents of the Crawford and Union City hatcheries. If this be done we feel there will be an appreciable increase in the output in 1908.

A disease called sore throat broke out simultaneously in the Corry, Spruce Creek and Bellefonte hatcheries last February causing a loss of about 3,000,000 young fish. The causes are discussed in their proper places by the Commissioner and Superintendents.

The Superintendents of the different hatcheries still find difficulty in successfully rearing frogs and it appears from their reports that there are still many problems to be solved before a large output is an annual certainty.

The Board made an inspection of the hatcheries during the year, found many improvements completed and in progress, but showing the need for larger appropriations. The Corry hatchery, the oldest station belonging to the state, has been for some time until this year in a deplorable state. There were not a half dozen of the nearly 50 ponds in a fit condition to hold fish. The hatching houses had deteriorated and the barn was in danger of falling down. For these conditions neither the Superintendent nor the Department of Fisheries nor the old Fish Commission were in any wise to blame. The reason was simply that there was not money enough to keep up the plant properly.

When the Department took charge it did what it could, expending a little each year. This year, on account of a special appropriation to the new hatcheries, it became possible to devote a few hundred dollars of the regular hatchery money towards putting things in shape. A new barn has been built, material to reconstruct all the ponds purchased and the interior of the oldest hatching house thoroughly renovated. It would take about \$5,000 to put this hatchery in the condition it ought to be.

The Erie hatching house is too small for the work it is called upon to do, and should either be enlarged or a battery house built at Union City or both. The Union City hatchery is in a surprisingly well advanced state considering that it is only two years old. One section is entirely completed except for the planting of trees and the final sodding and a second section well under way.

A large amount of work has been done also at the Crawford hatchery. Started under great difficulties in June, 1906, without a building of any kind thereon and high water to contend with, there is today a neat dwelling house for the Superintendent, a good barn for the cattle, tools and wagons and a capacious hatching house capable of holding three batteries and over a thousand jars, and already equipped with 350, a large bass pond, a sunfish pond nearly as large, a yellow perch pond and three fry ponds. The building of two more fry ponds will complete one section of this hatchery save for the grading which is now under way. A driveway is badly needed into this hatchery. At present there is nothing but the right of way in and the Board trusts that the Legislature will make a suitable appropriation for this purpose at its next session.

We found the Bellefonte hatchery in a condition to incite nothing but unstinted praise. There are nearly 60 ponds permanently built, a neat hatching house and the general surroundings very satisfactory. Progress is regular and marked, and, according to a statement of a well known fish culturist in another state, there are more brood trout in this hatchery than in any hatchery of the United States Government or any state, not including commercial hatcheries.

Less progress is at first glance apparent in constructing the Spruce Creek hatchery, which was started about a month later than the Crawford hatchery, but this was due chiefly to the necessity of first providing ponds for bass, located at the lower part of the grounds and to completing some elaborate preparations before beginning the construction of the trout ponds at the upper end of the hatchery. These preparations have been completed and by

the time the next appropriation is available, one section of the hatchery should be finished. As it is, unless some untoward event happens, the output from the Spruce Creek hatchery should be as important as from any hatchery under the control of the Department, though naturally not as large as one in which there are battery hatching houses.

The Torresdale hatchery is almost completed and it will soon be necessary to ask the city of Philadelphia to assign additional land in order to enlarge the plant. Many improvements have also been made at Wayne and the section immediately surrounding the trout house is completed and graded. A State road is also being built into the grounds.

The Board desires to place on record its appreciation of the interest and enthusiasm which the Superintendents and most of the men on the hatcheries display in their work. Few men employed by the State have as hard work or as long hours often necessary as those engaged in fish cultural work, yet it is seldom that a complaint is heard.

The fish protective work for the year has been as gratifyingly successful as the fish cultural work as a whole. The total number of arrests for violation of the fish laws somewhat exceeded those of last year. The relative proportion of convictions remained about the same and a less number of persons sent to jail in lieu of paying their fines. The amount of fines imposed was very nearly the same as last year and the collections were nearly alike. The regular wardens made more than three times as many arrests as the specials and the amount of fines imposed were likewise three times.

The total arrests were	536
Total convictions,	477
Total acquittals,	59
Committed to jail,	22
Fines imposed,	\$14,805
Fines paid,	8,295
Appeals to court, amount of fines,	3,850
Sent to jail, amount of fines,	2,660

The arrests by classes were as follows:

Number of arrests by regular wardens,	398
By special wardens,	112
By State Police and Constables,	26

The bulk of the violations were for infractions of the fish basket laws, the gigging laws and improper taking of fish by drawing off dams. Apart from these three offenses there has been a marked diminution in violation of the fish laws. This is especially true with respect to violations relating to the catching of game fish or the sportsman's fish. It is among those who fish for the market or for the table and petty sales and among a certain type of foreign element that most of the fish law violators are to be found.

The last named type give particular trouble. Coming to this country for a brief time and merely for the purpose of gathering

together as much money as possible to take back to the Mother country, many misconstrue liberty to mean license and hold every law in utter contempt. Many of them do not hesitate at murder or attempted murder to escape even the trifling penalties imposed for violation of the fish laws. Several of the wardens have been shot at during the year by this class of foreign element, though fortunately none were injured. One warden was attacked by a number of supposed natives and badly injured, but this is the only case of serious resistance on the part of native born or the more intelligent class of foreigners resident here.

There are 154 special wardens and nine regular wardens, including the chief warden, and while only 27 of the former class made any arrests, most of the remainder were useful and justified their appointments on account of the moral influence which they exerted to prevent violations of the fish laws. With so many men commissioned and with the difficulty of making a close examination into the character of each, it might be expected that a number would not deport themselves properly, but the Board is glad to say that less than half a dozen complaints alleging clear neglect of duty were made, and of these only three were proven—two were of a criminal nature and both were arrested and fined, one in the sum of \$50 and the other in the sum of \$1,300. The latter George Riley, being unable to pay this money went to jail for 1,300 days. Some of his friends and persons unaware of all the circumstances concerning the case and thinking the penalty excessive when compared with the character of the offense charged, sought to obtain his pardon.

The State Police that made the arrest, the Commissioner of Fisheries under whom Riley had been as a special warden, and the Secretary of the Game Commission under whom the man had also been a special game warden, entered protest against the granting of clemency by the Board of Pardons. This Board does not believe as a rule in running up fines to large amounts, but in this case, knowing all the circumstances, it feels that the man received no more punishment than he richly deserved. He was a sworn officer of the law. He violated both his oath of office and the laws which he was appointed to maintain.

The same may be said of the other warden, whose name is Philip Miller, and the one regret that the Department has is that a heavier penalty could not have been imposed.

The third case of dismissal was that of a special warden, who possibly more through ignorance than insolent intention, attempted to interfere and obstruct one of the regular wardens while in discharge of his duty. An investigation was made, the parties who had originally recommended him, admitted the impropriety of retaining him and he was thereupon dismissed.

With the enlargement of the appropriation for wardens, this Board reorganized the service. Authorized under the Act of 1901 to appoint 12 salaried wardens, it had money enough only to appoint nine and to pay their reasonable expenses. To do this much even it was impossible to make the salaries of the rank and file more than \$50 a month or to allow average monthly expense of over \$40. To the chief warden was given \$75 a month with reasonable

expenses. As there were but nine wardens it was necessary to apportion to each warden at least seven counties and to others eight, a territory entirely too large for one man to thoroughly patrol.

New rules and regulations were adopted which will be found appended to the chief wardens' report. Difficult as it has been for the regular wardens to thoroughly cover their territories, the results prove conclusively that the system of salaried wardens under proper regulations is the best. We feel that at the next session of the Legislature the number of regular wardens should be increased to at least 25 and money appropriated to pay them. We also believe that owing to the hardships and dangers of the work that a sufficient sum should be appropriated to permit the payment of a larger salary and a greater allowance for expenses. Forty dollars a month or less than \$1.50 a day is too small for reasonable expenses.

At the last Legislature there were three changes made in the fish laws. One was in the form of an intended amendment governing legal procedure. This the court within two or three months declared unconstitutional. A second was a law changing the methods of operating fish baskets. In some respects it is in the opinion of this Board an improvement over the original law, but in many respects it is unjust, both to the State and the fishermen, and is destructive to the game fishes.

According to the report of the chief warden, the great majority of the baskets were not constructed strictly in accordance with the law, and there is strong reason for believing that many of the licensees retained what game fish found their way therein. To detect such a violation is almost impossible and a man who would violate that provision of the law would probably not hesitate to take the affidavit required that he had not kept or allowed anyone to keep game fish. With the beginning of December such affidavits came in in numbers. The Board have grave doubt of the constitutionality of the act, but it is the part of the defendants and not of the Department to raise this question. The evil effects of the gigging law are generally admitted. In certain sections scarcely any attention was paid to the provisions, especially the one relating to the use of the device in public waters. This law is also apparently unconstitutional and the question has been raised by a defendant in the York County Court.

The items asked for by the Department in the general appropriation bill which were left undisturbed, are working out satisfactory, but those which were cut with severity are causing the Department serious trouble and it is doubtful whether by the practice of the most rigid economy, it will be possible to make both ends meet. This is particularly the case with the items for counsel fees and expenses of Commissioners. Four thousand dollars were asked for in each case. Many lawyers seeking fees for themselves have been inducing defendants plainly guilty, to contest in the hopes of getting them off on some technicality. This, of course, means a fee. A very proper ambition possibly, but one which is adding materially to the expenses of the Department. Until this scheme for increasing legal business was devised it was rarely necessary for the Department to employ a lawyer before a magistrate or a justice of

the peace. Now in at least two cases out of five, such employment becomes necessary, and in the majority of these cases appeals are taken to court, which means a further expense.

The legal expenses for the two years ending June, 1906, were more than the amount allowed for the years 1907 and 1908, and this in the face of the fact that an amount for a deficiency had to be put in the general appropriation bill. The amount for the expenses of the Commissioners was also less than the amount actually expended by the Commissioners in the previous two years, and that despite the fact of an authorized increase in the number of hatcheries.

The greatest expense, is, of course, incurred by the Commissioner of Fisheries, who must necessarily pay frequent visits of inspection to the hatching stations, and this business carries him often to different parts of the state and elsewhere on behalf of the Commonwealth's affairs. Such journeys naturally call for the expenditure of money. If a sufficient sum be not appropriated to enable these journeys of inspection whenever necessary, the work must inevitably suffer.

The Board feels that at the next session of the Legislature these two items should be increased. It believes also that the appropriation to the hatcheries should be increased by at least \$1,000 a year for each hatchery, out of the necessity for increased help and increased cost of labor, and also for the annual growth and improvement of the stations. It believes also that a much greater increase should be made to the item for field work. The present sum is \$4,000. Field work is as an important factor as hatchery work. It is field work which produces the eggs of the shad, the white fish, the lake herring, the wall-eyed pike, the yellow perch and the pickerel. Forty thousand dollars would be none too much for two years.

These recommendations are endorsements of the Commissioner's position and which recommendations will be found more in detail in his report, which, together with the reports of the chief warden and the Superintendents of the hatcheries, is found appended to this report.

The above is respectfully submitted.

W. E. MEEHAN,
HENRY C. COX,
JOHN HAMBERGER,
ANDREW R. WHITAKER,
W. A. LEISENRING.

REPORT OF THE COMMISSIONER OF FISHERIES.

The Department of Fisheries was established June 1, 1903, it succeeding a Fish Commission which had had charge of the fish cultural work of the state for many years before. Comparing the work done in 1903 with that accomplished in 1907, it would appear that the Department of Fisheries has expanded into a very large and important function of the state government. Nevertheless it must be evident to those who peruse this report carefully that the expansion which has taken place within the last four years is but a beginning, and that another four years should show an increase as relatively great.

In 1903 there were two hatcheries in full operation the year round for the propagation of brook trout, a field hatchery on Lake Erie open throughout the year and a field station on the Delaware river for the propagation of shad and therefore operated only about two months in the year, when it was operated at all.

One of the two trout hatcheries was owned by the state and there was an average annual output of between two million and a half and three million fish. The other was on rented ground and the average annual output was about a million and a half. The two stations ordinarily produced from three million to four million fish a year. It was rare that the field station at Erie produced 100,000,000 fish annually. The total acreage of land owned and leased by the State for fish hatching purposes was less than 40 acres.

Since the establishment of the Department the number of hatcheries has increased to eight, with a total of nearly 200 acres of land, all of which is owned by the state, excepting 10 acres. The number of hatching houses has increased from seven to nine, and the capacity of some of the older hatching houses greatly increased. The annual output of fish has increased from an average of 78,000,000 a year to more than 663,000,000. Two of the eight hatcheries in operation only a little more than a year made their first outputs in 1907.

That the great output of fish in 1907 only indicates the possibilities in the near future is shown by the fact that four of the eight hatcheries have only a small proportion of the acreage covered by ponds and buildings for fish hatching purposes. There are nearly thirty acres of ground at the Crawford hatchery at Conneaut Lake, and of this area less than two acres are occupied by ponds. At Union City there are 34 acres, of which about four acres are in use. At Spruce Creek there are 30 acres and not more than an acre and a half have ponds and hatching houses. At Wayne there are nearly

30 acres and not more than five acres have ponds constructed thereon. At Bellefonte there are about 35 acres and less than four acres are today in use.

As money becomes available the pond areas and hatching houses will naturally be added to and the outputs of fish increase in proportion. As it is the outputs from the hatcheries in Pennsylvania, through the ponds on its stations and field work, is greater than any other two or three states in the Union combined, with the exception of New York. The number of species of fish propagated has also been greatly increased. The following table will show the output of each species of fish and the totals for each year, including and since 1903.

OUTPUTS.

The following table exhibits the outputs of fish, frogs and aquatic plants from the various hatcheries and through field work from December 1, 1906, to November 30, 1907. The table does not include eggs shipped from one hatchery to another.

Gold fish, adults,	138
Gold fish, fingerlings,	521
 Total,	 659
 Catfish, adults,	 540
Catfish, fingerlings,	38,690
 Total,	 39,230
 Sunfish, adults,	 330
Sunfish, fingerlings,	19,000
 Total,	 19,330
 Sunfish, blue gill and long ear, adults, ..	 889
Sunfish, blue gill and long ear, fingerlings,	162,800
 Total,	 163,689
 Lake Trout Fry,	 2,509,000
Lake Trout Adults,	3,000
 Total,	 2,512,000
 Calico Bass, adults,	 283
Calico Bass, fingerlings,	15,200
 Total,	 15,483

Lock Leven Trout,	40,000
Total,	40,000
 White Fish Fry,	 39,445,000
White Fish, fingerlings,	1,500
 Total,	 39,446,500
 Yellow Perch, adults,	 75
Yellow Perch, advanced fry and fingerling,	237,601,375
 Total,	 237,601,450
 Pickerel, fry,	 249,000,000
 Total,	 249,000,000
 Rock Bass, adults,	 209
 Total,	 209
 Brook Trout, advanced fry and fingerling,	 8,377,750
Brook Trout, adults, old males,	2,259
 Total,	 8,380,009
 Rainbow Trout,	 270,000
 Total,	 270,000
 Suckers,	 10,000
 Total,	 10,000
 Wall-eyed Pike, fry,	 107,773,250
 Total,	 107,773,250
 Shad,	 5,834,000
 Total,	 5,834,000
 Black Bass, large mouth, fingerlings,	 1,600
Black Bass, large mouth, adults,	123
 Total,	 1,723
 Black Bass, small mouth, fingerlings,	 87,200
Black Bass, small mouth, adults,	433
 Total,	 87,633

Tadpoles,	92,900
Total,	<u>92,900</u>
Lake Herring, fry,	7,000,000
Total,	<u>7,000,000</u>
Aquatic Plants,	450
Total,	<u>450</u>
Smelts,	5,000,000
Total,	<u>5,000,000</u>

SUMMARY.

Goldfish,	659
Catfish,	39,230
Sunfish,	19,330
Sunfish, blue gill and long ear,	163,689
Lake trout,	2,512,000
Calico bass,	15,483
Loch Leven trout,	40,000
White fish,	39,446,500
Yellow perch,	237,601,450
Pickerel,	249,000,000
Rock Bass,	209
Brook trout,	8,380,009
Rainbow trout,	270,000
Suckers,	10,000
Wall-eyed pike,	107,773,250
Shad,	5,834,000
Black bass, large mouth,	1,723
Black bass, small mouth,	87,633
Tadpoles,	92,900
Lake Herring,	7,000,000
Smelts,	5,000,000
Aquatic plants,	450
Total,	<u>663,387,524</u>

THE FISHING SEASON.

For the last three years in reviewing the results of the fishing for the year, I was able to show a general increase each year, with the exception of one species, shad, but this year I am glad to say that I do not even have to except this splendid food fish. While the number of shad caught in the Delaware river was not as great in 1907 as in 1899 and for the previous nine years, it was greater than any year in the present century. Prices also ruled higher, hence it is stated that most of the fishermen made money. As a rule, the shad fishermen "cut out" their nets about the second of June, and it is very unusual to find many gillers after that date. This year the shore fishermen operated their nets to within a week of the close season with only but two exceptions, and the gillers drifted almost to a man until the last day of the open season. The probable causes which hold to this increase will be discussed by me under the head of the shad work on the Delaware. Many shad were caught in the Susquehanna within Pennsylvania waters, more than was expected, in view of the building of the huge dam across the river near McCall's ferry.

The entire year has been a notable one in the fishery world, and it was good alike for sportsmen and commercial men.

TROUT SEASON.

There was such a notable improvement in the trout fishing in 1906 over that of 1905 and so many small fish were seen in the streams that anglers looked forward to even a better year in 1907. They felt that their efforts at stocking the streams from the State hatcheries were having beneficent results. The outcome of the opening day added strength to the expectations. April 15 was anything but an ideal day for trout fishing. While there was much sunshine there was a heavy wind blowing in nearly all parts of the state and the temperature was low. In some sections there was snow several inches deep on the ground and there were flurries at various times during the day. Fly fishing as a rule was out of the question, but with the exception of a very few sections, the bait fishermen secured many more trout than they expected.

From reports received the average size of the fish captured was much larger than either 1906 or 1905. The fish ran so well in this respect that for the first time since the creation of the Department of Fisheries the wardens found occasion to arrest only three people and the State Constabulary two. This scarcity of violation is indicative both of the wholesome respect which trout fishermen generally regard the law and also to the beneficial results of what is known as the six inch limit. Fishermen in Potter and Tioga coun-

ties informed the wardens that there were so many large fish that there was no temptation for them to keep small specimens.

The best reports on opening day came from Centre and Monroe counties, although with very few exceptions most of the trout counties yielded satisfactory results. Fish measuring from 7 to 19 inches were caught in some abundance. A 19-inch brook was caught in Monroe county and a 19-inch "rainbow" in Centre county. Nearly 100 17 and 18 inch fish were reported to the Department.

Unfortunately the entire month of May was cold and the water temperature so low that the trout did not exhibit their full game qualities and did not take the fly readily, but large numbers were caught with bait.

Thus it was the bait fisherman who had no fault to find with April and May and their catches averaged very well. It was not until June when the weather became warm that the fly fishermen had their innings, and for the entire month they had splendid sport. Unfortunately the effects of a great drought then began to be felt, and only skillful men were very successful to the end of the trout season.

Reviewing the trout season, however, impartially and taking adverse conditions into consideration, the expectations of anglers that 1907 would exceed 1905 were fulfilled.

BLACK BASS SEASON.

Very few complaints were received from bass fishermen from any section of the state, excepting the lower Susquehanna. Even there it was declared to be much better than the previous year, which in itself is not saying much for bass fishing in this once splendid region has been very bad for several years. The best reports come from the upper Delaware and the north branch of the Susquehanna, especially in Wyoming and Bradford counties. Some complaints were heard from the West Branch, but there were more who declared the fishing to be better than usual. Dr. Steven Sturdevant, of Meshoppen, Pa., in a letter concerning the North Branch of the Susquehanna, wrote, "In regard to the bass question I can report good results from the present laws. There are more large bass in the Susquehanna than we have had in fifteen years and the reason is plain. It is because they were not speared out and the dynamiters are not so bold. * * * Carp seem to be decreasing in numbers and I believe this is because there are large bass present. The cheapest and most logical way to get rid of them is to get the river full of bass of both kinds and they will solve the problem." Mr. W. B. Rhodes, of Danville, who is known as a keen sportsman and Susquehanna fisherman, is one of those who had the misfortune not to find the West Branch of the Susquehanna in as good condition as other streams in that part of the state. Under date of November 18th he writes in part as follows:

"This year I spent two months in camp above Allenwood in Union county. My fishing is almost exclusively for black bass. I found conditions of weather and water most favorable between August 12th and October 12th, but the fishing poorer than I ever experienced in that locality. The first week we took some few bass of good size, but after that period there seemed an almost total absence of bass or salmon. Skillful fishermen from Milton, Watsontown and other places reported the same condition of affairs both regarding bass and salmon. Although we had most beautiful weather and water and later for ideal sport I failed utterly, and further I could see no signs of the presence of the fish. No signs of late or early jumping after minnows although feed was quite plentiful. There was one marked feature, however, that struck me as abnormal; the abundance of the so-called water dog. We found them in abundance where we usually looked for small catties. My man reported to me he had disturbed at least fifty on a certain riffle when hunting catties. One morning one fisherman took from his outline thirteen of these so called water dogs, some of them so enormous they measured close to a yard long. * * * I hope you may find some value in my experiences. I am an ardent lover of bass fishing, but I think I will have to quit my beloved Susquehanna and cast my line in less familiar streams."

The Beaver river in western Pennsylvania seems to be recovering its old reputation for bass fishing. Ex-Representative Ira S. Mansfield wrote this department as follows concerning this stream:

"With increase in population, great increase in campers, the fishermen all have fair success. Bass, salmon, blue catfish, perch, rock fish and sun fish are doing well."

Pine Creek, which empties into the Susquehanna at Jersey Shore, appears according to reports to have entirely recovered its old reputation. Hon. Henry C. Cox, one of the members of the board of Fishery Commission, reported to me that this year bass were caught in numbers as far up as Four Mile Run, a section hitherto confined to trout only.

Bass fishing in the lakes, one of the most uncertain things in the best of times, was said to have been much better than usual.

WALL-EYED PIKE.

The beneficent results of persistent and heavy stocking by the State is amply and clearly demonstrated by the season for wall-eyed pike, known on the Susquehanna river as "salmon" and on the Allegheny as "jack salmon." The Delaware, the Susquehanna and the Allegheny rivers, together with many of their large tributaries are reported to be teeming with this great fish. If complaints to the Department are well founded, the fish pirates around Dun-cannon caught thousands of them in the early part of the year by means of their unlawful nets and other devices. Fishermen began taking wall-eyed pike almost as soon as the season opened, rather

an unusual circumstance, and many fish of very large size were caught. Five to six pounds was not uncommon and some eight pound fish were reported. The poorest section for wall-eyed pike was undoubtedly the West Branch of the Susquehanna. Multitudes, however, were caught in the Juniata and far above Petersburgh.

SUN FISH.

There was undoubtedly a marked increase in the number of sun fish taken and from the species caught unquestionably the increase has been due to the work of the Department in the last three years in hatching and planting this dainty game fish. The sun fish is esteemed most by anglers in Montgomery, Chester, Berks, Bucks and Lebanon counties, and as time goes on it is becoming more appreciated. The applications received in this office for sun fish are among those which rank in number after the trout. Indeed it ranks only next to those of the bass. The fishermen in the counties named declare that they had the best sun fish fishing for years.

LAKE TROUT.

The results of persistently stocking the interior lakes is beginning to show results. Many of the natural mountain ponds yielded fair lake trout fishing last summer. Harvey's Lake in Luzerne county, and some of the lakes in Susquehanna county gave the best results. Quite a number of fish weighing ten and twelve pounds each were captured.

CUT THROAT TROUT.

Three years ago, the Department received a consignment of cut throat trout eggs from the United States Government. Not desiring to risk a duplication of the brown trout experience, I caused the fish hatched to be planted in three lakes, one in Wayne, one in Susquehanna and one in Luzerne county, hoping the fish would take the place of the lake trout. It is a species which grows rapidly in large bodies of water and is, besides, a surface feeder. I am happy to say that in two of the three lakes success was marked. Last summer many fish seven or nine inches long were seen, and a few were caught, but the anglers knowing what they were, having been warned, replaced them carefully in the water.

PICKEREL.

It has been a quarter of a century since there has been such fine pickerel fishing as in 1907. If all the reports which come to this office are correct, there was not a let up from the opening of the season on June 15th to the time of writing this report, and residents of Wayne county wrote the last of November that "tip-up" fishermen were getting their limit of twenty pounds in two or three hours. Not only has the pickerel fishing been restored in the lakes, but pickerel were caught in large numbers in rivers, streams and artificial ponds. Most of those caught were fish seemingly about two years old, the result of the stocking by the state in 1905. There is every reason to believe that if this stocking be continued, in a few years pickerel will be one of the most abundant fish that we have in Pennsylvania.

YELLOW PERCH.

It would be incorrect to say that there has been an improvement in the yellow perch fishing in the mountain lakes in the north eastern part of Pennsylvania, because that would be impossible. Those bodies of water have been full of yellow perch from time immemorial, but larger fish are appearing and better fishing was experienced in the lakes in the western parts of Pennsylvania, and better fishing was had in Lake Erie for them.

WHITE FISH IN LAKE ERIE.

While feeling great pleasure in the improved character of the game fishing, I feel special pleasure in reviewing the field of commercial fishing, especially that of the white fish. I think that I can now say that judging by the results of 1907 and the previous two years, that the white fish industry in the waters of Lake Erie under the control of Pennsylvania, has been completely restored. 1907 yielded more white fish to the fishermen than the best year in the history of Lake Erie. The most satisfactory evidence is the fact that the fishermen found white fish of all sizes in their nets and in abundance. From one to two thousand pounds a day was not an uncommon catch.

COMMERCIAL FISHERIES ON LAKE ERIE.

There can be no stronger evidence of the healthy condition of the fisheries than the figures showing the catch and value thereof in 1907 in that part of Lake Erie under the jurisdiction of Pennsylvania. A comparison of the tables for the years 1903, 1905, 1906 and 1907 will show a very gratifying state of affairs. The white fish catch was more than five times that of the year 1906 and more than 17 times the catch of 1905 and 16 times that of 1903. The blue pike catch was the greatest known in the history of the fisheries of Lake Erie, according to the fishermen. It is certainly greater than anything of which the Department has record. It was 12 times greater than in 1906, 4 times greater than in 1905 and 11 times greater than 1903.

There was a big fall off, however, in lake herring, it being only one half that of 1906, one third that of 1905 and one fifth that of 1903. But there is nothing alarming in this fall off and in view of the facts nothing indicative of a decrease in the number of this species of fish in the lake. Weather and temperature conditions during the greater part of 1907 were adverse to large catches of lake herring. Both were very unfavorable during the summer and barely normal in the spring.

The unfavorable temperature conditions for good catches of lake herring made favorable conditions for heavy catches of blue pike, and this fact alone gives strong foundation for the conviction that it is not a decreased number of fish which brought about a decreased catch. The figures given for the catches of fish in 1907 and value thereof are compiled from figures furnished the Department by the various dealers in Lake Erie and the independent fishermen resident in the city of Erie. In addition to these there were a number of boats owned by fishermen in Ohio and New York who fished in Pennsylvania waters under the new laws, also pound and trap fishers west of the city of Erie and the trappers east of Erie and one dealer in the city from whom it was impossible to gather figures, but it is estimated that their catch would add at least \$75,000 to the value of the catch. The following table gives the weight in pounds of blue pike, lake herring and white fish caught in 1903, 1905, 1906 and 1907. 1904 is omitted because in that year the Department was unable to gather accurate data:

Name.	1903.	1905.	1906.	1907.
Blue Pike,	1,964,000	3,215,863	1,021,206	12,159,983
Lake Herring,	5,032,000	3,060,250	2,696,065	1,883,963
White Fish,	36,500	31,369	113,278	574,265

The following table gives the value of the catch for the years 1904, 1905, 1906 and 1907:

1904,	\$300,000 00
1905,	201,085 94
1906,	168,995 14
1907,	305,913 39

The following table shows the total catch of fish and the value of each during the year 1907:

Name.	Pounds.	Value.
White Fish,	574,265	\$46,879 74
Blue Pike,	12,159,983	169,203 67
Lake Herring,	1,883,963	75,138 52
Miscellaneous,	263,253	14,691 46

The miscellaneous fishes include carp, catfish, sturgeon, yellow perch, wall-eyed pike and mullets and a few other fishes.

The Department has been restocking Lake Erie with yellow perch, this valuable food fish having become almost as nearly swept from Pennsylvania waters as white fish. Restoration has not been complete, but from the figures received from the dealers, I believe that in another year it can be added to the list of important fishes, as nearly 60,000 pounds were caught in 1907.

TROUT FINGERLING vs. YEARLINGS FOR PLANTING.

Ever since fish culture has become prominent in Pennsylvania and in fact throughout the country there has been a warm discussion over what were called trout fry and fingerlings for stocking streams. This discussion was not confined alone to anglers but became heated among fish culturists. Indeed it became so warm that the American Fisheries Society, a national organization which meets yearly in different parts of the United States by common consent barred the subject from its discussions. For a time Pennsylvania, Michigan and Wisconsin were the only three states on which the fish culturists unitedly advocated the planting of fry. Michigan went so far as to uphold the planting of fry with the sacs on. Wisconsin, if I remember correctly, took the stand for fry as soon as the sacs were absorbed. Pennsylvania for fry when they were three or four months old. Today nearly all the states distribute their trout at about the same age as Pennsylvania advocated. The United States Government also has generally adopted the plan of planting trout fish of about this age.

There was a great deal of confusion among the states through their using different terms to signify the age and size of trout. Some called fish until the fall of the year fry, other called them fingerlings. In order that there might be uniformity and each state know for a certainty what the other was doing the American Fisheries Society at its annual meeting at White Sulphur Springs, West Virginia, in the summer of 1905 adopted the following as uniform regulations:

Fry, with the sac on.

Advanced fry, fish having the sac absorbed but less than one inch in length.

Fingerlings, fish of one inch in length and over but less than a year old.

Yearlings, fish of one year old and over.

Fingerlings of various fishes were numbered 1, 2, 3 and so on according to their inches, and yearlings in the same manner.

Fish more than a year old to be termed two year old, three year old and so on.

These terms are now used in this report and in all the operations of this Department, instead of calling the three or four months old fish fry as formerly.

Those in former years who advocated the planting of fingerlings known as yearlings claimed that a few fish of this size would accomplish better results than a thousand fry now known as fingerlings; the advocates of very young fish hold the opposite. They conceded that if fry now called fingerlings were planted in the stream from which it was expected to catch them the results would be nothing because any large fish which might be there would devour them, but they held that if the little fish were planted in their natural environment, to-wit, small spring runs tributaries to the main stream and scattered throughout the entire length of such streams the results would be far greater than the planting of even an equal number of yearlings. They pointed out the following as reasons:

Trout when held in the hatchery must get artificial food principally ground lungs and liver and thick milk. Such fish must inevitably become tame and look to man for their food, and they also acquire the schooling habit which is foreign to the nature of the fish. When planted in the fall there is naturally very little natural food in the streams and what little there is the fish do not know how to hunt. To use a homely but forceful utterance of one of the superintendents of the hatcheries, "when the trout are put in the streams in the fall of the year they at once go swimming around the creek enjoying themselves, but at four o'clock in the afternoon they poke their noses out of the water and say, 'where is John with the liver?'?"

Having the schooling habit the fish when planted in the pools cling together and thus there is even less chance for them to get food. They therefore are likely to become thin and weak and are an easy prey to their many enemies. When spring opens and the trout season begins they are so ravenously hungry that they eagerly

go to the fish hook, are caught and perhaps killed. On the other hand fry or fingerlings, as they are now called, though fed with artificial food until planted are sent out early in the spring when insect life is becoming abundant, when the food is, so to speak, ready to their mouths for devouring. They do not have to hunt and by the time food begins to get scarce in the fall they are plump, hearty, have forgotten artificial foods and know how to hunt for what there is in the streams. They have therefore only to avoid their enemies and when spring comes are as wary as any wild trout, in fact are wild and by no means as great a percentage rushed to destruction on the hook of the angler.

It has been asserted and many believe that very young trout are washed out of the spring runs during heavy storms and lost, but this belief does not seem to be borne out by facts. Indeed it may confidently be stated that so strong are the little fish that it is not believed the greatest storm in Pennsylvania and the greatest flooding of the creeks could change a little fish from its course for more than a minute or two. So endowed are they with instinct or intelligence that when a current becomes too strong they seek shelter behind stumps where they wait until the water goes down. If the water rises above the banks they may swim over into the fields, but generally make their way back into the creeks with the receding waters. Sometimes, it is true, that a number get caught in low spots and die, but this is equally true of large trout. This fact was proven conclusively at the former State hatchery at Allentown. There were nearly three dozen ponds filled with trout of all sizes from yearlings to four year old, and with fry or fingerlings.

There came suddenly a terrific storm which caused the Little Lehigh Creek to overflow its banks and bury the hatchery grounds under water from two to four feet deep. When the waters receded it was found that there had been a total loss of about 9,000 fish, most of which it was subsequently shown found lodgment in the creek. Something less than 500 were found dead in the fields and these were fish of all sizes from one inch to twelve. The remainder, over and above the 9,000 which were lost were found in the ponds, but they were all sizes in every pond. As the waters went down the fish which had been swimming around the hatchery grounds sought either the ponds or the creek; two-thirds the former and one-third the latter.

It is from results that success or failure in planting fish is determined.

In Michigan where it was the custom to plant fry, or fish with the sacs on, the streams which hundreds of years ago had almost been depopulated by lumbering, have now been restocked and are among the best in the country. The streams in Pennsylvania in the last four or five years have shown a remarkable increase. The fishing is declared as a rule to be better than in previous years for two decades. It is experienced and it is results which leads this Department to strongly advocate the planting of fry, now known as fingerlings at the age of four months. Experience and results undoubtedly have led other states to adopt the same system.

PLANTING MINUTE FRY HATCHED FROM JARS.

This department has frequently been asked why it is that fish like wall-eyed pike, yellow perch, pickerel, white fish, shad and analogous fishes are distributed for planting almost immediately after being hatched. Sometimes there is a well meant criticism expressed that the Department should keep these fishes until they are of some size and better able to take care of themselves. The critics aver that 1,000 fish of any of the above named species would produce better results than 1,000,000 microscopic fish which are sent out from the hatcheries. Naturally, most of the criticisms are based on imperfect knowledge of the subject they discuss and of the conditions which bring about the planting of fish like wall-eyed pike, yellow perch, and pickerel and the like, as soon as they are hatched, and also the motives of the Department of Fisheries.

There are two great reasons which cause the Department to plant such fish: first, necessity; second, a desire to save the waste, as it is termed, by the fish culturists. There are at least a dozen other reasons, but in the face of the two named, it is a waste of time to mention them. At present there is no known method of rearing wall-eyed pike in any number beyond a few weeks after hatching. To rear a few hundred thousand white fish to four or five months old, would be a very uncertain experiment and so costly that the wealthiest State would hesitate to undertake it, and I doubt whether the United States Government, with all the money at its command would consider it. Attempts on the part of the United States Government to hold shad, have not been happy. It is said that Connecticut has had a little better success, and from what I have heard, I am convinced that the results achieved by the "Nutmeg" State, were far below those achieved by the United States and Pennsylvania in planting fry in the Delaware River between the years 1890 and 1900.

There is in addition, a great underlying principle, greater even than the necessity just described, and the reasons for which might be overcome that lead the Department to pursue the cause it does with the wall-eyed pike, pickerel, shad, yellow perch, white fish and lake herring, and that is a saving of the waste. The eggs of the fishes just described are eggs which, with a few exceptions, are from fish which have been taken in nets for the purpose of being sold in the markets. If they were not taken by the fish culturists and hatched they would be lost or wasted, and every fish which reaches maturity from eggs taken in this manner is a fish saved and so much gained.

If after taking a certain number of eggs, enough to produce a few hundred thousand fingerlings, the work of egg gathering would stop, all of the hundreds of millions of eggs would be wasted. All the two hundred acres devoted to rearing ponds for the more than six hundred million fry annually produced, would not be one fourth of the acreage required.

I must, however, from my experience as a practical fish culturist, and from my knowledge of the life history of fresh water fishes take issue with those who believe that better results can be achieved by planting fingerlings, than by planting the myriads of almost microscopic fish.

It has been estimated by those who have studied the subject, that not more than two per cent. of the fish actually hatched from such species as yellow perch, white fish shad, and pickerel live to reach maturity. This means twenty fish to every thousand which emerge from the egg. Yet, were it not for the interference of man, the two per cent., small as it is, would be sufficient to keep the water teeming with fish life. If, therefore, 50,000 minute fry are planted in a body of water containing the usual adverse environments, we would have a thousand survive to reach maturity.

If care be exercised in planting, and the directions given by the Department followed, there is a fair prospect that four or even five per cent. may survive. As a matter of fact, it is not so much the size of the fish that is planted as how the fish are deposited, which largely determine success or failure.

I am aware that it must be bewildering to say the least to an applicant who received for the first time a consignment of yellow perch or pickerel or some other fish of almost microscopic size excepting when the light shines into the can in a certain direction, nothing will be seen excepting water, and when the light does shine properly in the opening, the water will be seen to be full of little hair like creatures, darting hither and thither and enjoying life and health. The Department has some very amusing experiences in shipping pickerel and perch and such fish to new applicants, for example, the first year the Department undertook the propagation of pickerel five cans were sent to an applicant in Sullivan county. In due time there came a telegram from the applicant to the Department saying, "I applied for five cans of pickerel. I have received five cans of water. What shall I do with it?" I telegraphed back, "Plant the water, have faith, and see the fish grow." I have since received a letter from the applicant stating that the pickerel were showing with some abundance in the stream in which he planted the water. That the Department has made no mistake in planting these small fish is shown by the numerous letters received. The following are examples: "Sir: Enclosed you will find three applications for three cases of pickerel which you will kindly send to my address at Pittsburg. We had some from you last season and it turned out very well. Wm. Drurey." "May 22, 1907. My Dear Sir: I wish to acknowledge the receipt of ten cans of wall-eyed pike on Saturday, May 4th. They were all very active when we put them in the stream. In the spring of 1906 I put ten cans in the Cocolomus Creek and by October of the same year they had worked down the stream about one-half a mile to deep water where they had congregated in schools of several thousands and attained a size of one and one-half to probably two inches. Yours, R. M. Jamison."

The superintendent of the Wayne hatchery in his report which is appended to this report cites as an example of the beneficial results of stocking with yellow perch fry in Hankins pond in Wayne

county. It is an artificial body of water, having a length of more than a mile, and a width of at least a quarter of a mile. It is well stocked with pickerel, creek minnows and chubs and bullheads, but according to the superintendent yellow perch were unknown there. In 1905 a planting was made from the Wayne hatchery and a second in 1906, and a third in 1907. He states that these fish are now abundant in this lake, and they are being caught weighing from a quarter to a half pound. Surely there could be no better evidence than this.

WATER POLLUTION.

The pollution of streams and rivers in Pennsylvania by industrial establishments forms one of the chief obstructions which this Department encounters in its efforts to rapidly and effectively establish fish and maintain them. Conditions in this respect, however, have been materially improved in the last four years through the intelligent work of the Department of Health, and to a very much lesser extent by this Department through the limited powers conferred by law upon the Commissioner of Fisheries in this respect. Hundreds of streams in which the polluting material was injurious to human health have been partially or entirely cleared of such material. Substances destructive to fish life have been cleared from some streams through the efforts of the Department of Fisheries. Sometimes through moral suasion and sometimes by legal proceedings.

But while there has been a decided improvement in the character of many of the streams there are still numbers of waterways which are in a horrible condition and which are practically used as open sewers by industrial establishments. The problem of the purification of the waters to an extent which will render them harmless to human, animal or fish life is an exceedingly difficult one to solve. On the one hand is the peril to which capital may be subjected in consequence of a sweeping and drastic measure compelling owners of industrial establishments to provide some methods of disposing of their sewage and waste material other than dumping them into a stream, and on the other hand there are the rights of the people to have their health safe guarded, their cattle preserved from danger of disease and death and the rights of the people to have the aquatic animal food products, of which fish is one, maintained.

Putting out of consideration the question of preservation of human and domestic animal health as not being within the province of this Department to discuss at length, it may be said that under ordinary circumstances the question of the relative importance of an output from an industrial establishment and the maintenance of fish life cannot and should not be taken into consideration. The importance of providing wholesome natural animal food for the people is far greater than any consideration of capital invested in an industrial establishment. There is this much to be

said with regard to concerns which are and have been in operation for years. They are there by the tacit consent of the Legislature, because almost invariably when any measures were introduced looking towards the abatement or abolition of water pollution, such measures were either defeated or so amended as to make them practically inoperative.

Hence while there is little doubt that the police powers of the Commonwealth are sufficiently broad to cover the question by legislative enactment, it is a question to be considered whether or not in equity the owners of industrial establishments which have been in operation and emptying their material into the streams by the tacit consent of the Commonwealth, should not at least be partially compensated for any expense which they might be put to to abate the evil. No such compensation, however, could by any argument in my opinion be awarded an establishment that is hereafter put in operation. Under no circumstances should they be allowed to pollute the waters and make open sewers of streams to an extent that will destroy or drive out fish life. While some polluting materials which will kill fish neutralize others injurious to human health and so make the water useful for consumption, it may be set down as a sound general proposition that waters so polluted as to be unfit for fish is injurious to human kind.

Chief among the larger streams which are either ruined or being ruined by polluting material are the Allegheny and Monongahela rivers and the Sinnemahoning creek, especially the First Fork of the last named stream. It would be difficult to find another waterway in Pennsylvania in which more horrible conditions prevail than in the First Fork of the Sinnemahoning. For several years people in the neighborhood of that stream have been, so to speak, up in arms against the conditions which prevail there. Almost incredible stories are told of the character of the polluted water.

I made a personal but superficial investigation in 1905 and from it I could readily believe most of the stories which have been told.

The Chief Warden of the Department who made a more careful investigation found people who declared that cattle had contracted anthrax from the water; that persons who ventured to bathe in the stream had sores develop on their bodies, and, if any abrasions or sores however slight already existed, they would be inflamed to an alarming degree.

Warden Conklin in a report to the Department says:

"Sinnemahoning creek, including East and West Branches, is the worst polluted stream in my territory. The various trout streams emptying into it afford fair returns. As to the main body, nothing can be compared to it—unparalleled for filthiness and pollution, not from sewage of towns, but from the unspeakable refuse thrown into it from industrial establishments."

In a letter received from a prominent citizen and an official residing along the Sinnemahoning it was declared and proof volunteered that persons who had the misfortune to be immersed in the water had their legs, arms or bodies burned; that the legs of ducks swimming in the stream were burned and that the legs and bodies

of cattle had horrible burns from the chemicals in the water. The letter was promptly turned over to the Department of Health.

Conditions on the Allegheny and Monongahela are reported deplorable. Many people who see conditions similar to those on the Sinnemahoning and who are not brought into contact with all the work of the Department of Fisheries sometimes blame the Department for not abating or preventing the pollution. Warden Conklin in his report voices the sentiment of this class as follows:

"I hear many complaints from people while patrolling that the expense of stocking the streams and maintaining them go for nothing when the fish are killed off by the hundreds and thousands by the poisonous substances discharged into the streams, but when a fisherman catches a fish under size he is fined \$10, and the owners of the factories and plants are allowed to go free."

These people do not understand the limitations of the Department of Fisheries. By a decision of the Superior Court, the provisions of Section 26 of the Act of May 29, 1901, relating to explosives and poisonous substances is held to apply to pollution by industrial establishments under certain limited conditions beyond which the Department cannot go. Streams in which all the fish have been destroyed or driven out are beyond the jurisdiction of the Department of Fisheries. In other words the Department cannot punish the owner of an industrial establishment or prevent him from emptying his waste material into a stream which is barren of fish. It can only proceed where there are fish in the stream and where there is a specific and direct proof of their being killed by material from a specific industry. Or still more explicitly if there are two establishments each emptying waste material into a single stream and fish are killed thereby, it would be essential for the Department to prove and show that each establishment separately killed fish, otherwise the charge against the two establishments would not hold good. At least that is the experience of this Department.

I am glad to say that public sentiment is today widespread and emphatic against stream pollution than it was a few years ago.

TROUT CULTURE.

Trout culture is the nearest thing to an exact science known in fish culture.

Before the art of taking and hatching trout eggs was discovered, it was like that of Columbus discovering America, although it was not until 1842 that trout culture became a business or a practical work.

Trout may be raised from the egg to beyond breeding age. There is in fact very little of a purely experimental nature about the work. There may be varying expressions concerning the size and depth of

the ponds. There may be different methods of building hatching troughs and setting them, but many of them in the hands of experienced fish culturists bring successful results, and this is true whether referred to the true trout or the Charr, otherwise known as the speckled trout found native in the waters of Pennsylvania.

We know that the Charr or speckled trout spawns at the age of twenty months and a true trout at the age of three years; that in their natural environments the spawning months of the Charr or speckled trout are October, November and December, and of the true trout in the spring.

An abundance of cold pure water, clean ponds, a bountiful supply of food consisting of ground lights and liver for mature fish, and liver paste and thick milk for advanced fry and fingerlings, and hatching troughs for the eggs with a skilled man in charge will produce fish.

With the taking of the eggs it can almost definitely be determined how many fish will be ready for distribution or planting four months later, and it may be asserted with some surety the number which will be in the ponds one year later from a certain number of fingerlings placed therein in the spring.

It has been the practice of the state not to feed the fingerlings or yearlings as generously as is done in the Commercial Hatcheries, for two reasons:

First, because there is not the same necessity to produce large fish at the age of twenty months, and second, because there is danger that overgrowth will produce a larger percentage of unfertilized eggs. Still I think state fish up to the age of twenty months might be given more food. Under present conditions there is a larger percentage of very small fish than is desirable. At the Bellefonte Hatchery out of about 45,000 twenty months fish about 5,000 were so small as not to produce any eggs worth speaking of. There is therefore a year's loss of time and eggs.

In the Commercial Hatcheries by stuffing the fish with all they can possibly eat, fish at twenty months old are, about the size of the average three years old in the State Hatcheries and each yields as many eggs. If twenty months old fish in the State Hatcheries average one hundred eggs per fish they are doing well. In the Commercial Hatcheries they will yield an average of five hundred at least. As an example of the great difference I might illustrate by citing the cases of the fish at Bellefonte and a Commercial Hatchery in Carbon county. From each 40,000 fish at Bellefonte, males and females, there were taken about 2,300,000 eggs. From about 35,000 fish in the Carbon County Commercial Hatchery there were taken very nearly 9,000,000. While the hatch from the Bellefonte eggs was infinitely better than the hatch from the Commercial plant the total actual fish was far greater proportionately than Bellefonte.

A few persons with more information than knowledge of trout culture rushed into newspaper print during 1907 describing the work of trout culture, and only for the business damage which the misinformation is apt to cause I would not pay any attention to the utterances of these people.

Among other things it was asserted that the fry when the sac had been absorbed, or as one of them expressed it, dropped off, the

little creatures were so wild that the care-taker in order to induce them to take food was compelled to cover the troughs with canvas or boards and feed them by pouring the food through a funnel at one end, and that the trout in the ponds were likewise wild. As a matter of fact the young fish in the troughs and the old fish in the ponds are as tame as can be. If any visitor on a State Hatchery should poke his finger in a pond or trough it is a certainty that before he could withdraw it, it would be grabbed by the mouth of some hungry trout, and a half hour before feeding time the fish will follow a person walking around the pond like a flock of sheep. Advanced fry in the troughs pay little more attention to a visitor walking through the aisles between the troughs than they would to a stick, and if their mouths were large enough, or if a person were able to hold food small enough, the advanced fry would take it from their fingers.

ALGAE NUISANCE.

One of the difficulties encountered by the Superintendents is Algae which accumulates in many of the Hatchery ponds, sometimes in such vast quantities, that it is difficult and sometimes impossible to properly care for the fish therein.

A curious feature about this nuisance is that there appears to be no rule which regulates its appearance or non-appearance, excepting that it does not seem to flourish or appear in ponds into which the water falls from a head in some volume, or where the water flows through the ponds with great rapidity.

In some stations even where neither of these conditions prevail the algae will not form in ponds the bottoms of which are heavily graveled, and only where the bottoms are thinly graveled or become covered with a mucky deposit which is not promptly cleared away, while in others the algae appears to flourish equally well on graveled bottom ponds, but generally speaking in both instances there is not a heavy water supply for the ponds.

One of the most notable instances of algae prevailing in ponds in which the inflow is at the water level is the two ponds at the Torresdale Hatchery. One pond is immediately below the other, the water dropping about two to three feet from the first to the second. They are each nearly 300 feet long. In the first or upper where the water flows in on a level algae grows with tremendous rapidity and in such quantities that it is difficult for the men to work their fish. In the lower pond there is scarcely any algae.

Many efforts have been made by the Superintendents to rid the ponds on the hatcheries of algae, but as yet they have found nothing that is satisfactory.

It is well known that sulphate of copper will destroy the algae, but we have also found it risky to use in quantities to kill algae on account of possible harm which comes to the fish. Experiments have been made to ascertain how much sulphate of copper a fish can stand before dying and very remarkable results have developed.

At Torresdale, experiments conducted under my own direction showed that sunfish, bass and several other fish live for more than five hours without any apparent harm, though they died subsequently, in five ordinary wooden buckets of water in which had been dissolved two teaspoonsful of copper sulphate. Fish experimented with at the Crawford Hatchery lived nearly as long before dying in one bucket of water containing two teaspoonsful of copper sulphate. In the first experiment four out of eleven tadpoles survived the ordeal.

BLACK BASS WORK.

Among the most important work carried on by the Department during the year was black bass culture. Ever since the great game and food quality of this species of fish has been recognized, there has been a steady and growing demand from the people for the State to undertake its propagation on as great a scale as brook trout. The strong public sentiment became well illustrated four years ago, when delegates from nearly every fish protective and auxilliary of the State in convention at Harrisburg, unanimously demanded that the legislature establish hatcheries in Pennsylvania for the propagation of black bass, on the same scale as trout. That the legislature was in sympathy with the demand is shown by the fact that at the succeeding session the Department of Fisheries was authorized to establish three stations for the propagation of black bass and other fishes.

It is well known among fish culturists that the hatching of black bass is still largely in a experimental stage. They have only progressed far enough to demonstrate that under certain conditions there is a reasonable expectation of hatching a certain number of fish annually. But no fish culturist can say with absolute conviction that he can rear seventy-five or more per cent. to a length of three or more inches.

Fish culturists scarcely made their first experiments in rearing bass when they discovered it to be impossible to take eggs from the female fish in the same way eggs can be expressed from brook trout, white fish and shad. This peculiarity is so pronounced that at no stage is it possible to artificially take the eggs. Females have been taken from the nest while in the very act of spawning and attempts made to press the remainder from her. But it was found to be impossible even then to press out the eggs. It was further a remarkable fact that when a fish thus experimented upon was returned to the water she seemed to have lost completely the power of herself entirely voiding the remainder of her eggs they would harden in the ovaries and eventually cause her death.

Efforts to press milt of the male by artificial means were made.

It having thus been definitely determined that eggs of the black bass cannot be taken artificially, fish culturists tried the experiment of killing both female and male and fertilizing the eggs thus taken. The result were very unsatisfactory. First only a small portion of

the eggs hatched and secondly it was rather an expensive operation to kill the fish.

After repeated experiments of different kinds, the conclusion was reached that successful propagation of black bass could only be accomplished by building ponds of suitable size and to allow the fish to spawn naturally therein. The first government to attempt to rear bass in this manner was the state of Michigan and fair success was achieved, but the work was found to be costly. So costly indeed that an official of the United States government once expressed it to be almost prohibitive. Soon after Michigan commenced this work Pennsylvania began experiments and for several years met with nothing but disastrous failures. Finally in 1903 when about to abandon further experiments, sudden and unexpected success was achieved. Sufficient advance has since been made not only in Pennsylvania but by the United States government and sister states to show that bass can be raised at sufficient low cost to be well worth while. As yet and probably for some years to come it will be more expensive than trout culture, unless means are found to artificially take the eggs. The area of ground required for bass culture will be double or treble that required for brook trout, and then without producing as many fish.

There are bass ponds in operation at the Wayne, Torresdale, Spruce Creek, Crawford and Union City hatcheries. At present there is only one at each station named and none is exactly like the other. Each was built in accordance with the combined ideas of the superintendent of the hatcheries and myself, and at this time it is difficult to say one is better than the other, or that it is capable of producing better results.

The first bass ponds constructed in the Pennsylvania State hatcheries were quite small. They were each not more than sixty feet long, and about forty feet wide. Bass are no longer raised in these two ponds although success was achieved in them. In nearly all the bass ponds now in use the same general outline, namely that of an irregular egg-shape has been retained. All the superintendents unite in believing that a better current of water is secured by this form. It soon became manifest that the larger ponds within reason the greater the chances of success, and the larger the number of breeding fish which can be proportionately carried. The ordinary size of the ponds now in use are from half an acre to an acre with an average depth of one to two feet throughout with the exception of the kettle. At Wayne, Union City, Torresdale and Spruce Creek the kettles extend the full width of the pond at the lower end and slope upwards sharply 20 to 30 feet back. At Crawford, the kettle is triangular in shape with the apex at the outlet. If there is in one type which is better than the other it may possibly be this last form, but only for the reason that a greater spawning area is given to the pond.

In ponds about the size described we carry about a hundred fish of the breeding age, the larger proportion of which are females. One reason for carrying more females than males is that the former do not ripen at the same time, and when the male is seeking a female he has not patience to wait until he finds one which is in the condition but will run amuck through the pond, and if he comes upon a ripe female upon a nest, will fight the male in possession, and en-

deavor to take her away. It has been found that, notwithstanding a larger proportion of females the eggs of none are wasted. The male bass is something of a polygamist and in addition, after he is through with one rearing he will take another female and go to nesting again, so that the eggs of every female are pretty sure to be fertilized and hatched. The spawning period of the black bass is from the middle of May to the middle of June, and even later depending on the temperature of the water. The bass will not begin to spawn with the water below 55. If spawning has begun and the water temperature falls to 50, spawning ceases. At 45 any eggs which have been laid will die. At 42 fry, that is fish with the sacs on will die. This was demonstrated clearly at the Crawford hatchery last spring as will be seen by the experience of the Superintendent of that station, which appears attached to this report.

It is the male which does everything but laying the eggs. He selects the site for the nest, he builds the nest and gets it ready for a female. In the bass ponds built in one hatchery, a clay bottom is preferred by the fish culturists over one with gravel of stones such as a bass delights in at spawning time. This is in order to induce the black bass to go on the nest provided, and artificial nests are provided so that they can be better controlled. The artificial nest is made of stones, varying in size from a marble to an egg, and placed cup shape in a space about two feet square in the bottom of a wooden box, two sides of which and the top are open. Notwithstanding this, nests are thus made with extreme care, it often happens that the male bass in looking for a site, absolutely refuses the nest, and builds one of his own out in the mud. At Spruce Creek Hatchery nearly all the nests of the bass were stolen and built in muddy places.

According to Superintendent Safford, these natural nests generally contain more eggs than those of the artificial nests. He gives as a possible reason that "in the actual spawning, the fish becomes tired of the seeming semi-confinement in the boxes, and before the eggs are all cast the female sometimes leaves. With the few eggs deposited, the male is well enough satisfied to proceed to work." He adds "however, I do not say this positively." Proness of bass to deposit more eggs in stolen nests than those made by the fish culturists, has been noticed by other superintendents of the state hatcheries, and while Mr. Safford expresses himself cautiously as to the reason, his theory seems plausible.

The object of the kettle is in order to have a place where the fish can hibernate and also when the pond is drawn off there will be a little water to hold the fish. When spring arrives and the temperature of the water rises to about 54 the fish begin to scatter over the ponds and show activity. The male soon feel the instinct of reproduction and starts hunting a site and building a nest. Selecting one of the artificial nests the male bass begins to cleanse the stones of any dirt sediment or foreign substance which may have lodged there. All of the lighter foreign substances are fanned away by the pectoral and caudal fins. Sometimes the stones or gravel are not placed just to the liking of the fish and these he arranges according to his fancy or his needs by rolling them to the position he desires by means of his head or his nose. Naturally the work of putting the nest in order is not very arduous, and some of the outside natural

nests require great toil, but notwithstanding the rough work, it is seldom that the fish comes to any injury with consequent fungus growth.

When the nest is completed the male starts out to seek a mate and he pays court to the first female he meets. Apparently, he is unable to discriminate at the time between a female which is ripe and a female which is not ready to deposit her eggs, for it is not an uncommon occurrence for him to coax an unripe female to the nest where he endeavors by many curious means to induce her to deposit her eggs. Failing, he drives her incontinently away and seeks another. He approaches the new female as he did the other with many contortions of the body, swimming around and around her, and fondles her by nipping her gently on the cheek and belly, and all the time guides her persistently towards the nest. His actions at this time can only be compared to a "cake walk." When he finally reaches the nest, the female passes over it, apparently with great indifference, and frequently will swim away as though she intends to decline going to house-keeping. At such moments the male exhibits great excitement and perturbation, urging her back by every means in his power. Finally she decides to remain. The pair swim around and over the nest, the male nipping the female at intervals, and then turning sidewise the bodies are rubbed together the male thus assisting the female to void her eggs and the female the male to discharge the milt. The eggs are thus fertilized as they issue and fall among the pebbles. The act of spawning is not completed at one time, but extends over a period of a day or two. One spawning lasts only for half an hour, but during that period a great many eggs are deposited.

The male bass is occasionally a polygamist, and instances have been noted where the male, during the interval while the female was on the nest resting, seeing a female outside passing, would bring her on the nest to add to his store of eggs. And sometimes without any apparent reason he would drive his mate away and seek another. The abandoned one apparently takes her ejection philosophically, for it has been recorded that she has been known to attach herself to another male in another part of the pond.

The egg laying being completed, the male takes full possession, drives the female away and assumes entire charge of caring for and hatching the eggs. He hovers over them, fanning away all dirt and during the period of incubation, he does not eat anything. He is very savage, fears little, and angrily drives away any fish which approaches. The period of incubation is from 7 to 10 days, and when the little fish of the small mouth species emerge from the egg they are almost colorless and settle among the stones. In 24 hours they become black. In a few days, as the sac is absorbed they rise to the surface, and sinking to the stones if the temperature of the water lowers. As soon as the little creatures become strong enough, the male bass, keeping them in bunch form, works them into shore, and finally leaves them. This is in natural production in a wild state. When the fish on the artificial nests in the hatchery ponds have their sacs nearly absorbed and show signs of rising, the fish culturist places a crib or circular iron frame covered with cheese-cloth over the nest, excluding the male. This nearly always renders the parent very savage. He is almost fearless of man at such times, and as

will be noted in Mr. A. G. Buller's report, a male deprived of his young will frequently strike savagely at the net being used to remove the fry from the fry ponds.

Mr. Safford, Superintendent of the Crawford hatchery, experimented with feeding the advanced fry with daphnia before removing them from the crib and he found a decided increase in growth over those which were removed to fry ponds without the preliminary feeding.

Experience has taught us that there should be four or five fry ponds in the aggregate as large as the original brood ponds and for the excessive growth of the little fish there should be a bountiful supply of the aquatic plant known as the Chara moss growing therein. Without Chara moss there must be a much less degree of success. Chara moss is the favorite resort for minute water animal life especially of the daphnia and cyclops of which small bass are inordinately fond.

In order to facilitate the removal of young bass when shipping time arrives, the bottom of the pond for about two feet on the sides and ends should be kept clear of Chara moss.

One of the hardest problems which confronts fish culturists today for rearing young bass for distribution is the inordinate cannibalism of the fish. The moment they can swallow anything the advanced fry begin to eat each other. By heavy feeding from the Chara moss and artificial foods, cannibalism may be kept down to a minimum for the first 30 or 35 days. After that time it is uncertain how many fish may be taken from the pond. At 35 days the well fed fish is from one and a half to two inches in length. We had an example about three years ago of the extent of cannibalism which prevails among young bass after they are a month old even under favorable conditions for preventing it. 20,000 fish by actual count were placed in a pond in which there was considerable natural food. They were fed six times a day with ground fish which they eagerly devoured. Between the first of July and the first of October 210 dead fish were removed from the pond. On the first of October when the water was drawn and the fish taken out, there were only 11,000 fish left, but these were from four to five inches long.

Mr. A. G. Buller in his report refers to a remarkable example of cannibalism at the Union City hatchery. Among the fry ponds of this hatchery was one containing over 20,000 bass fry which was in excess of the number required to fill the applications for the district in which the station is located. I issued an order that these fish should be sent to one of the other hatcheries where there was a shortage so that all the applications in that district might be filled. When the superintendent of the Union City hatchery drew the pond for the purpose of carrying out my instructions, to his amazement instead of several thousand there were only about one hundred and fifty fish. The remainder had been devoured and the 150 sturdy fish were the sole survivors of a vast carnival of cannibalism. There was some excuse for this tremendous example of cannibalism at Union City in that the fry pond having been newly constructed there was no considerable quantity of Chara moss and therefore little natural food, and the fish did not take kindly to the artificial food which was provided them.

At the Spruce Creek hatchery there were over 20,000 bass and the little creatures were placed in the only fry pond available. This body of water was about 70 feet long and 40 feet wide with a depth of about 2 feet. The bottom was covered with Chara moss, the stems of which were nearly covered with daphnia and cyclops. In fact the food was so abundant that as the superintendent and force of the hatchery were nearly overwhelmed with work, I consented that the young bass be held until the middle of August or until they were about 65 days old. In the first week in August the superintendent cut away the Chara moss which had become so thick as to make the use of the net impossible without first doing so. When the fish were netted from the pond there were 2,200, the remainder had disappeared as utterly as though they had never been. Nearly the same experience befell the superintendent of the Torresdale hatchery in his attempts to rear large mouth bass. The pond at that station was nearly double the size of the pond at Spruce Creek and there were only about 5,000 fry placed therein. 1,723 was the total in the middle of August.

These experiences demonstrate clearly in my mind the necessity for numerous fry ponds at least 50 by 50 feet each, preferably larger, and in each should be placed as small a number of fry as possible and to provide about an abundance of both natural and artificial foods so as to bring about as rapid a growth as possible which will permit fish to be shipped at the age of 35 days old and of a size to insure of their being able to take care of themselves when planted.

I am a believer in the general principles of planting fish as soon as possible after hatching without regard to their being of minute size. I especially favor this idea when by so doing they can be hatched in numbers only limited by the quantity of eggs secured, and the capacity of hatcheries. In such cases I confidently rely on the proper character of the water and the natural foods therein and the large quantity of fry which can be shipped to an applicant.

In the case of black bass I feel it necessary to modify my principles a little, not too much on account of the inability on the part of the young to take care of themselves, but because of the restricted number which can be hatched in a hatchery by pond culture and because black bass fry is, so to speak, nothing but a mass of jelly like substance covered by a black tissue like skin. In this condition they are extremely difficult to ship, and unless unremitting care be observed there would not be one left alive at the end of a moderate journey. Thirty days appear to me to be about the most favorable period both for the stream and the credit of the fish culturists, and in this principal my superintendents all concur.

Owing to the fact that black bass culture is yet in an experimental stage only; owing to the fact that eggs cannot be taken from the fish artificially; owing to the fierce canibalism which makes it the most destructive fish which swims in fresh water, it has been thus far impossible for the Department of Fisheries to fill every application which has been received annually. It is the policy of the department, however, not to throw away the applications received from the above supply, excepting where there is over duplication for one stream but to file them away for first filling the following year. Failure to fill all applications is naturally not pleasant to either the Department or to the applicant and the Department is putting

forth its efforts to surmount the difficulty which now stands in the way of large production and in two or three years ought to be able to meet applications for black bass as confidently as it can those of brook trout.

FROG WORK.

It was little thought by the superintendents of the hatcheries when they first began frog work about three years ago that so many difficulties would be encountered in their propagation. It seemed such a small thing to gather and hatch the eggs and rear the tadpoles safely through the embryotic state and have them develop into perfect frogs. This feeling was helped along by the complete and sweeping success met with at Erie and Wayne. Ponds were built at all the hatcheries, the superintendents all went into the work with enthusiasm and met as a rule with overwhelming disaster. Over-crowding, red spot and other diseases, larvae of water beetle and finally but not least the much cherished daphnia. Every year enough frogs are reared to supply the applications, but usually the supply has come from not more than two or three hatcheries, the others meeting with failure. Enough has been learned from experiments to demonstrate that success can be achieved but not regular annual success, at least as far as our study of the habits of frogs and their culture has progressed. One of the superintendents who has met with each and every misfortune which has visited every frog pond in the other stations, had his curiosity aroused sufficiently to make an investigation to ascertain whether the troubles were confined to the tadpoles in the State hatcheries or whether they were equally wide spread among the tadpoles in the wild state. He found they were, and indeed as might naturally be expected the adverse conditions were more numerous. In the ponds, birds, snakes, fishes and animals could be kept away to some extent. In wild state they had full swing and in addition there was the daphnia, red spot and the larvae of the water beetle in as great if not greater abundance. The result of his investigation showed in the fact that a natural pool of tadpoles had less chance to survive than those in the hatchery ponds. It is now reasonably certain that in order to successfully carry the tadpoles through their embryotic stage and development to perfect frogs the following conditions must prevail: first, there must not be over-crowding; second, the water must be pure; third, there must be no daphnia; fourth, no frogs of mature age; fifth, no water beetles or other larvae; sixth, untainted animal food, preferably fish or fish liver.

Unquestionably the most desirable species of frogs to rear are the common bull-frog and the green frogs. They are also the most difficult in some particulars because they are solitary in their habits. The leopard frog, which is more gregarious, while delicate in flavor is small. They are, however, the easiest to handle, at least during the embryotic stage. The tadpoles of the common bull frog and the green frog seem to escape enemies like daphnia and water beetles to a greater extent than the tadpoles of the leopard frog. This

possibly causes them to spawn later in the season. The superintendents are divided in opinion as to whether the tad-poles of the common bull frog and the green frog develop into frogs the same year. Some are of the opinion that there are two spawnings. One about May and one about July; that the May spawn develop by autumn, but that the July spawning remain in the tad-pole stage until spring. The superintendents who hold to each opinion bring forward what seem to be good arguments and apparent proof for their respective positions. Having observed the work on all the hatcheries I am inclined to agree with those who hold to developing the same year where there is a spawning in May. Whether there are two spawnings or whether it is simply that a few deposit their eggs three months earlier than the usual time, I am not prepared to say. Certain it is, however, that the tad-poles of the large frogs at Lake Erie are developed into frogs by July from eggs deposited in May.

The critical period in frog culture is when the hind legs are about to break out. The act apparently draws heavily on the vitality of the tad-pole. If they have been well fed and guarded from disease and enemies there is certain to be a heavy percentage of tad-poles completely develop.

Carefully studying the subject I am of the opinion that several small ponds or pools are advisable or necessary for the hatching of the eggs and the development of the tad-poles, and that to achieve the best results in the effort to carry the frogs to a marketable age there must be a series of large ponds each not less than half an acre in extent and plentifully stocked with flowering water plants and that each size of frogs must be kept by themselves.

While tad-poles will devour almost any dead animal food offered, frogs will eat only living things and it is to provide for their securing living things that flowering water plants are necessary. This can be supplemented by grassy banks, little piles of manure and boards smeared with molasses or honey to attract insect life. Live tad-poles and small live fish may also be successfully fed to frogs.

There is a future in frog farming but the farmer must expect for some time to come frequent failures.

SALMON WORK.

The Fish Commission demonstrated several years ago that Atlantic salmon could successfully be introduced into the Delaware river. The first attempt was made in 1874 by Thaddeus Norris who had several thousand eggs hatched in New York State and planted in the Bushkill Creek in Northampton county. Although the Delaware river at that point was not in the best condition for smelts and parr as salmon in their first year are called. Several fish returned to the Delaware four, five and six years afterwards. In 1890 and 1891 the Fish Commission secured a lot of eggs from the United States Government, hatched them at the Allentown hatchery and planted them in tributaries of the Delaware river in Pike and Wayne

counties. In 1894 quite a number of grilse or first run salmon entered the river, and 1895 salmon to the value of over \$5,000 were taken from that stream. For several years thereafter salmon were caught in some numbers and one was seen in the river as late as the summer of 1906.

The United States Government was unable to continue furnishing Atlantic salmon eggs owing to the scarcity of the fish in the Penobscot and Kennebec rivers in Maine. A few thousand eggs were given to the Department of Fisheries in 1904 in order that an effort might be made to domesticate the fish in the Hatcheries, but only six of these reached maturity and spawning age. In 1907 it was found that the six were all females. An attempt to fertilize the eggs with the brown trout failed.

Efforts were made from time to time to establish the Quinatt salmon, a fish belonging to the Pacific coast, but every effort was an utter failure. Nothing was seen of the fish after they left the streams and entered the Delaware. After three or four efforts it became evident that the Quinatt salmon could not be established in the Delaware river, and it was believed because this stream was too far south of the natural spawning area of the fish.

Efforts on the part of the Department thus far to secure Atlantic salmon eggs in any number have failed. There is a law which prohibits exporting the eggs from the Dominion of Canada. It is possible that eggs may be obtained from Newfoundland, and I believe, that if the Legislature would make an appropriation, the United States Government would join with Pennsylvania in establishing a Field Station in Newfoundland and thus getting the eggs for the Delaware river.

In order to make a salmon stream of the Delaware river it would be necessary to plant fingerlings year after year without stopping at any time, because even when the fish begin to spawn naturally it would not be in sufficient quantities to maintain them in large numbers, but by stocking heavily annually the Delaware without doubt can be made a salmon river equal to either the Kennebec or the Penobscot.

SILVER SALMON.

In discussing the question of the establishment of salmon in the Delaware river with Commissioner Bowers and Dr. Hugh M. Smith, of the United States Bureau of Fisheries, a year ago they suggested that an attempt be made to introduce the silver salmon. They stated that its natural spawning grounds on the Pacific coast were nearer those of the Atlantic salmon and were almost indeed identical with it.

An offer was made to supply the State with eggs for a period of four or five years to ascertain the possibility of establishing it. I naturally agreed, and 100,000 eggs are to be sent to the Wayne Hatchery this winter as a beginning.

As a food fish the silver salmon is said to be inferior to the Chinook, but that does not indicate poor food qualities; since the Chinook salmon is regarded as being unequalled to any other species on the Pacific Coast in its commercial value; indeed it ranks according to Messrs. Jordan and Evermann as being next to the Chinook and the Blue Back in importance. It is one of the best species to

ship fresh, and large quantities are canned annually on the Oregon and Washington coast. It is abundant in the Columbia river. In size it ranks third among the Pacific salmon, attaining a length of about 33 inches with a minimum size at maturity of 15 inches. The average weight is from three to eight pounds, but it is frequently found weighing from 12 to 15 pounds. It is known by many local names in the north west and Alaska, the most common of which is Coho salmon; it is also known as Kisutch, Skowitz and Quisutsch. The spawning period is about September. It has a slender body, short head, very conical, with a blunt pointed snout. It is a beautiful fish to look upon, being of a bluish green on the back with silver sides having dark punctulations, but no spots excepting a few obscure ones on the top of the head, the back, the dorsal fin, the adipose fin and the rudimentary upper rise of the caudal. The sides of the head are without dark colorations and in the fall of the year, during breeding time, the sides of the male are colored a bright vermillion red. During the rest of the time it is colored a very pale vermillion.

When the eggs are received and hatched a few thousand will be retained at one of the Hatcheries in an endeavor to domesticate it and to study its habits.

SHAD WORK.

There was a decided improvement in the shad fisheries of the Delaware in 1907 and everything indicated the correctness of the position which I have hitherto taken, that the principal cause of the falling-off in the number of shad caught since 1900 was due principally to adverse weather conditions.

The report of the superintendent of the Torresdale Hatchery will show that very early in the season of 1907 while the weather was warm and the temperature of the water raised there was a good run of shad followed almost immediately by a marked decrease with the subsequent arrival of very cold weather and cold water, further, that as soon as the temperature of the river again rose fish began coming into the river once more. That the take was very much better than for several years previous is shown by the increased number of eggs which were taken at Torresdale, there being 2,000,000 more than in 1906 and 1905.

Owing to the fluctuations of the water temperature very few of the female trout shad caught were ripe and there were several hundred that were apparently within 24 hours of being in that condition. The eggs in the roe were loosened, but not sufficiently so to permit them being expressed. In all there were less than 140 ripe shad taken, and one gave the remarkable number of over 90,000 eggs.

The Superintendent tried many experiments to ripen the fish which were nearly ready to spawn, but owing to inadequate apparatus none of the experiments were successful.

Preparations will be made in the coming spring to endeavor to ripen successfully hard fish. Something of this sort must be done if the shad are to be preserved in the Delaware river. If unfavorable

water conditions prevail for several years in succession it will render it impossible to hatch more than 3,000,000 or 4,000,000 or even 5,000,000 eggs, and the shad must become exterminated because 5,000,000 or even double that number will not maintain shad in the Delaware. The fish is helpless against its enemies. It is an easy prey for any carnivorous fish. With the high prices ruling for shad the fishermen will naturally strain every effort to catch every specimen they can in order to supply the market.

It may be necessary for Pennsylvania if it is found impracticable to ripen shad in cribs, or if the spring weather conditions do not radically change, to go to southern waters for eggs. I trust, however, that our experiments will not render it necessary.

While a number of shad were caught in the Susquehanna river above McCall's Ferry the industry was markedly less than in previous years, owing to the erection and near completion of the McCall's Ferry Dam. The shad fisheries of the Susquehanna are, I believe, doomed. While a few may pass through the fish ways the bulk will not make the venture the same as the other species of fish will do, owing to their extreme timidity.

In September a school of fish described as herring were seen in the Susquehanna river, first near Bald Friars; a week later a few miles above, and still later not very far below Harrisburg. The appearance of the school was reported to the Department, but they were evidently too large for herring and it is believed that it was a school of shad. This belief was strengthened from the fact that in November a fish about the size and appearance described got into a fish basket not far from Dauphin and this fish was a shad.

GERMAN CARP.

It is said to be difficult for man to acknowledge what he believes to have been a mistake and to do it publicly, yet I see no alternative when facts and conditions arise contrary and radically different from those which seemed to have prevailed and which led to his first viewpoint.

This is the position in which I find myself with respect to the German carp. Familiar, as I was many years ago, with the character and habits of the fish, I was among those who did not approve of the introduction of the German carp into Pennsylvania waters. From this position I have not changed.

I was then, it is needless to say, not connected in any manner with either the Fish Commission of the State or any fish cultural work. I looked upon the German carp from the standpoint of an angler. It was not considered as a fish for the angler and not regarded by anyone as a high class food fish. It seemed to me then and it seems to me now a mistake to introduce an inferior fish into waters capable of sustaining much better species both for the anglers and the markets, but the carp was introduced. It was introduced, not for the angler but entirely as a fish claimed to be valuable for food and one

which on account of its wonderfully prolific nature and the ease with which it could be cultivated. Farmers were told that it could easily be reared in the duck ponds on their places or in ponds dug on waste swamp lands.

The United States Government and States propagated the fish and turned them over to the eager farmer who thought he was going to make a fortune or considerable money with a nominal outlay.

Carp were also planted liberally in streams. It soon proved that its prolific character was not mis-stated, but the farmer discovered that carp culture was not as simple or inexpensive as it had been represented to him, further that his duck ponds or hastily constructed swamp ponds did not produce carp of a quality which commended itself to the taste of the consumers of fish. The filth and mud gave a strong taste to the fish. As a consequence the would be farmer culturist either broke away his ponds or allowed the fish to escape and gave up the business in disgust. Anglers did not know how to fish for carp years ago with hook and line consequently not having a high opinion in the first place condemned it even more heartily.

Having thus obtained a bad name the fish kept sinking lower and lower in public estimation until nothing was too bad to be said about the fish. Its known bad habits were magnified and a marked decrease in fish life in the waters of Pennsylvania were laid almost wholly to its acts. There were many things which gave strong color to the charges made against the carp of bringing about a decrease of other fish life, and I am sorry to say that I also, along with many others, was misled by what I know now to have been circumstantial evidence and not direct proof.

Among the charges made against the German carp are two of great gravity. First that it is a spawn-eater and feeds eagerly and extensively on the eggs of any fish it can obtain, and second, that it roots up certain plants which are almost essential to the existance of small fish. These two reasons along with others of minor importance caused me in the report for 1904 to express the opinion that the fish should be exterminated. Along with a thousand of others I believed that the spawn-eating and plant destroying habit was responsible for the diminished supply of fishes in the warm water streams.

My position, however, as Commissioner of Fisheries brought to my attention a number of facts, which while they did not acquit the German carp of being either a spawn-eater or a plant destroyer, still proves conclusively that other more potent agencies were at work which brought about poor fishing from 1900 to 1904 than the much abused foreigner. It was pointed out for example that Pine Creek, while it did not contain German carp in any number, had lost its old high-standing as a bass stream, that the Perkiomen Creek in Montgomery county while containing many carp still remains a good bass fishing stream, and the same was shown to be true of the North Branch of the Susquehanna river. The Delaware river, which was full of carp, and, in fact, the stream from which the main supply for the City of Philadelphia, not brought from other States, and in which the bass fishing had been bad, began to resume its normal condition in 1904. As a matter of fact today evidence is almost overwhelming to the effect that the very bad fishing between 1900 and 1904 was

due to illegal fishing and high freshets and not materially to the German carp. It must also be admitted that the German carp is not the only destructive fish. In fact there are others, which, like the German carp is not indigenous are even more destructive than the carp, notably the black bass. If it were not for the splendid game qualities of the fish and its equally fine table qualities the man who first introduced black bass into the waters of Pennsylvania would be execrated as heartily as Benedict Arnold. Apart from individual objections to the German carp there is one feature about the fish which must cause any thoughtful person to pause before declaring emphatically that it should be exterminated and that is its growing value for food purposes in the market of the great cities. For a long time no person ate the carp except the Italian. A large and important class of citizens began buying them for their table because they could buy them alive, clean them and prepare them according to their religious rites. Today it has even a more widespread sale. More than 40,000 pounds are sold weekly in the market of Philadelphia alone and with one or two exceptions is the highest priced fish, bringing retail sometimes as high as 20 and 22 cents per pound and rarely less than 10 cents. At ten cents a five pound carp will bring nearly as much money as a buck shad would in 1907, and a live carp of the same weight at times would bring more than a fine roe shad.

The German carp has become one of the most important fishes of Illinois. In 1907 there was shipped from that state to New York, Boston and Philadelphia nearly 20,000,000 pounds of fresh fish of which nearly all were carp and buffalo, and the bulk was of the first named species. Although Ohio has a greater water-front on Lake Erie than Pennsylvania, its fish industry is very little greater than that of Pennsylvania, and it is the carp which gives the Buck Eye State the first place.

Under the circumstances, it seems to me, that there should be a sober second thought before pronouncing emphatically for the extermination of the German carp. In the first place I do not believe that it can be exterminated; it is too prolific. It will flourish where other fish would find a difficulty in holding their own. I do not advocate myself the increase of the fish in the streams of Pennsylvania, for I think there are better indigenous fish, but I do believe it would be worth while for the State to encourage farmers within easy reach of cities like Philadelphia, Pittsburg and Scranton to undertake the culture of the fish, just as the State should encourage Commercial Hatcheries for trout. I believe such establishments should be so constructed and supervised by the State that fish cannot escape into the public streams. If the carp are not propagated for distribution in public waters the annual operation of commercial men will keep the number down and this work will be assisted by the voracity of such species of fish as the black bass and pickerel.

Warden Shoemaker in his report writes as follows concerning the fish:

"Few have a good word for the carp. In my estimation this fish is very much abused by the large majority, but a few are friends of the carp and the number is increasing. I have been watching very carefully all along the river (North Branch of the Susquehanna) the workings of this fish. They do to some extent destroy the nests of

the black bass, but on the other hand I failed to find any small carp, and I think the small carp are furnishing a large supply of the food of the black bass, wall-eyed pike and pickerel. Years ago any amount of small carp could be seen in the eddies, but few can now be found any where. The carp destroy to a great extent the eel grass and other vegetable matter up and down the North Branch of the Susquehanna river the natural hiding places for all kinds of fish, but the vegetation is beginning to reappear."

BROWN TROUT.

A few years ago the Fish Commission decided to discontinue the rearing of brown trout. It did so because of the many protests received from all parts of Pennsylvania against the further propagation of the fish. The protestants declared that its carnivorous habits were so pronounced and its strength and size so much greater that it was destroying brook trout. A careful investigation seemed to bear out the charges of those who desired that the fish be not propagated further. In many streams the brown trout predominated where, before their introduction, the same streams were abundantly supplied with brook trout. There was no doubt also that the brown trout was inferior to the brook trout both as a game fish and for its table qualities. Unlike many introduced fishes the change of environments did not appear to effect its reproductive qualities and the fish multiplied rapidly. Because the Fish Commission believes it to be inferior both in game and food qualities and because it believed the charges, that it was destructive to the brook trout, to have a foundation, in fact, and because of the protest, and because further the hatchery space was limited, the Department ceased to propagate the fish.

With the passing of years some new conditions have arisen which seem to call for a renewal of brown trout culture, at least to a limited extent. There are unquestionably many streams in Pennsylvania, the water of which, through deforestation have become too warm for brook trout but is yet cool enough for the maintenance of brown trout. There are also many streams like Piney Creek in Blair county, for instance, in which the brown trout have so strongly established themselves, that brook trout have become scarce and can not be plentifully re-established. For such streams it seems desirable that brown trout should be reared, and after much hesitation and only after consultation with many anglers throughout the State, I have decided to again undertake the propagation of the fish on a limited scale. If it were not that many persons not understanding the true nature of the brown trout but looking only to the large size to which it grows could be kept from applying for them for regular trout streams, I would have no hesitation whatever in undertaking its propagation, but I foresee trouble from this class of applicants and it is going to be extremely difficult to deal with the subject properly. I have decided that no applicants for brown trout for any stream will be approved unless it is accompanied by a petition

signed by the best known anglers of the section, asking that the application be granted and also setting forth either that the water has become too warm for brook trout or that brook trout have been practically driven from the stream.

The brown trout is a curious illustration of the rule that degeneration often follows introduction into new environments. The brown trout is the English trout, the fish concerning which the patron of all anglers, Izaak Walton, wrote in his "Complete Angler." To speak disparagingly of the brown trout to the English angler is like speaking ill to him of a true friend, but whatever the fish may be in England, he is certainly inferior to the chara or speckled trout of the North Atlantic coast in the latter's home. To those who are skilled in catching our indigenous brook trout, the brown trout has but two good qualities; first, his initial strike, which is very heavy and savage owing to the peculiar method by which he in common with all true trout take the fly or bait. Under certain conditions also like the true trout, he will leap several times after being hooked, something the charr never voluntarily does, notwithstanding the prose and poem stories which we see in magazines and books, to say nothing of pictures.

RAINBOW TROUT.

The rainbow trout is another fish that the Fish Commission some years ago ceased to propagate. It was impelled to this action for three reasons; first, because a careful investigation failed to show that the fish naturally propagated to any extent after being planted; second because a very large proportion of the fish kept in the breeding ponds at the hatcheries were either barren or what was equally undesirable, failed to give good eggs; third, because there was so little pond room in the two trout hatcheries. It was therefore thought better to utilize the space occupied by the breeding Rainbow for brook trout a much more desirable fish in every way. Two of the three reasons no longer exist, or rather have lost their force. There are today four hatcheries for trout and all of them have practically unlimited space at the command of the Department for ponds, hence, a large percentage of barren fish causes no embarrassment.

The failure on the part of the fish to naturally propagate in considerable numbers also seemed an unimportant consideration, because it is to-day recognized that natural reproduction in a stream plays a very small part in the maintenance of fish life, excepting in streams remote from large centers of population. Apart from the apparent fact that it is not a free reproducer naturally, the rainbow trout seems to be a very desirable fish, while it is not as good for the table as brook trout it is fully equal to the chara or speckled trout in game qualities. It is a free and vigorous fighter, leaping time and again after the manner of true trout and excepting in very large waters, does not greatly exceed the brook trout in size. It is stronger than the brook trout and under normal conditions would

probably drive that fish from the stream but its apparent inability in Pennsylvania waters to multiply rapidly, renders it impossible that it should clear the stream of the better species. It has moreover from the standpoint of the fish culturists a merit namely that under normal conditions the rainbow trout spawns sometime after the brook trout has finished that function so that its propagation means an added output without in the slightest degree affecting the output of brook trout. This statement, of course, does not apply to the steel head, which is often mistaken for the rainbow by anglers. In our hatcheries the steel head spawns almost simultaneously with the brook trout and grows almost with the same rapidity as the brown trout. In fact, specimens have been caught weighing ten to twelve pounds or more. Some protests have been made to the introduction of the rainbow trout but investigation in nearly every case showed that it was due to anglers having mixed the rainbow in their minds with the steel head California and brown trout. In many localities the brown trout is called the California trout, and many people have confused the California trout with the rainbow trout, hence when I announced my intention to take up again the propagation of rainbow trout many supposed I meant brown trout. This year we hatched about 250,000 rainbow trout at one hatchery. This number will be added to by the coming into breeding this year of several thousand fish at another station, and next year they will be produced at a third hatchery and a year later at a fourth and last hatchery for the propagation of trout.

SUCKER PROPAGATION.

I have stated elsewhere in this report that I believe the State should propagate and maintain in the waters almost any fish which has an economic value for food purposes and this has led me to undertake the culture of several fishes which are not taken care of by other States, notably, the pickerel, bull-head and cat fish. My attention within the last year or two has been drawn to the sucker. There are many who regarded it as an almost worthless fish, only to be swept from the streams—to be exterminated. There are two classes which hold this view, one among anglers for the highest class game fish and for the other, their very antipodes, those who seek excuse to use gigs and other exceedingly destructive devices for catching any kind of fish but while there is an element both good and bad who desire to see the sucker cleared from the streams there is another and very large class that hold entirely different views. There are thousands of people in Pennsylvania who look upon the sucker as a very desirable and even delicious food fish especially early in the spring and in the fall when the water is cold and the flesh of the fish hard. This class protests firmly against the extermination of the sucker and want the fish increased. It has besides a very pronounced value in the markets, comparing favor-

ably with any fresh water fish to be found therein outside of the shad, white fish and wall-eyed pike. I have determined therefore to undertake the propagation of the sucker for any streams in which people desire them, excepting possibly trout streams.

Having come to this determination, I engaged the superintendent of the Wayne hatchery to experiment with artificial propagation and he found that it was not only practicable but exceedingly easy. Eggs could be taken with freedom without harming the brood fish and that they could be handled easily in jars. We shall therefore hatch them in all the stations where the jar method is employed as soon as we can secure fish with which to stock our breeding ponds.

SUNFISH WORK.

Among the fishes which early attracted my attention as one desirable to increase was the sunfish. In 1901 the south east and the east central counties presented the claims of the sunfish so strongly both as a food and a game fish that the Legislature placed it among the list of game fishes with an open and closed season, the same as the black bass. Its elevation to this dignity caused some surprise among the people of the counties in the north east in which are located most of the natural mountain lakes. There the sunfish is so abundant that it was looked upon somewhat as a nuisance, especially in the lakes in which pickerel and black bass are abundant. To-day the people in that locality understand a little better especially since the introduction of the blue gill or Lake Erie sunfish, a species much larger and more valuable than the indigenous long eared and common fish which has a distinct commercial value in the Erie markets.

As the sunfish was beginning to disappear in the streams of Berks, Bucks and other counties having considerable population, and where most esteemed it seemed desirable that its artificial propagation should be undertaken. Experimental ponds were constructed at both Torresdale and Wayne and the method of culture pursued was the same as for black bass, namely, to permit the fish to build their own nests, deposit their eggs naturally and hatch them without disturbance. Success was both immediate and gratifying and ponds were thereupon ordered built in all the hatchery grounds where black bass are reared, but wherever it was that the water was suitable.

The Department of Health hearing of this work asked the Department of Fisheries to engage in it to as great an extent as possible, pointing out that the sunfish is exceedingly fond of the larvae of the mosquito and that as the fish is especially suited to many waters in which the pestiferous insect, especially where the mosquito breeds, the introduction of the sunfish therein would be a great aid to the Department of Health in its warfare against the malarial mosquito. This proposition naturally had my full sympathy and has since had my active aid. Many thousand fish of the blue gill, long eared, common and even the small yellow sunfish have been turned over to the Department of Health for its meritorious purposes.

There is little or no skill required to propagate the sunfish. A pond of considerable area with a gravelly bottom and with an average depth of about two feet is all that is necessary. The space cleared for nests is larger than that cleared for black bass. The male is more pronouncedly polygamous than the bass and frequently has three or more females on the nest at the same time. So far as their own species is concerned they are friendly and a dozen or more nests may frequently be found in close proximity to each other. The males of the black bass are, however, fierce towards other fishes of their own kind if they intrude or attempt to intrude upon the nest and it is a curious fact that the sunfish will successfully drive away even a black bass if it approaches too near his home. One can almost imagine seeing the scales of the sunfish spread out like the feathers of a bantam rooster as he angrily drives away a fish as it ventures too near. The hatching and caring for the young is almost identical with the methods followed by the black bass and the little fish follow the same course as the young of the bass, excepting that they seem to hang in schools rather longer. While it is desirable to remove either the young fish or the old from the breeding pond it is not necessary since the large fish are not so prone to devour their young as the black bass. Still many will be eaten and therefore the separation is desirable and I believe the best results are obtained by removing the old fish from the breeding pond and allowing the small fish to remain. I believe this to be best because it is probable that there would be more food than in the average fry pond.

SMELTS.

The efforts being made by the Department of Fisheries to establish salt water smelts in our fresh water lakes and ponds are for a two-fold purpose.

First, to provide a valuable and delicious food fish.

Second, to provide a good food for the gamefish.

It has been proved conclusively by the State of New York that smelts although a salt water fish can be successfully cultivated in fresh water. Lake Champlain, and I believe Lake George, contain multitudes of them.

This species of fish although a salt water fish spawns entirely in fresh water, and through the courtesy of New York I effected an exchange for the last two years by giving New York some thousand brook trout fingerlings for several million smelt eggs. These eggs having been hatched were planted in a lake in Wayne county, which, while of small size, is similar in character to Lake Champlain, and with a spawning bed exactly the same as that desired by the smelts when seeking places to deposit their eggs.

It should be determined in the spring of 1908 whether or not the efforts have been successful to introduce the fish.

HYBRIDS BETWEEN BROOK AND BROWN TROUT.

Three years ago Wm. Buller, Superintendent of the Corry hatchery, fertilized eggs of the brown trout with the milt of the brook trout.

The result was about 200 exceedingly beautiful fish with pronounced marks of the true trout or salmon. As the fish comes towards maturity the scales of the true trout are plainly visible. Apparently there are no spots, but on the sides there are a thick marble appearance identical with that on the back of the Charr or *Salvelinus*. Apart from the scales the fish bears a very close resemblance in outline to the Charr. It therefore became interesting to watch and see the period of maturity, whether it would be the twenty months of the Charr or the three years of the true trout. At the age of twenty months two of the fish produced a few eggs, but they were no good. At the age of three years, in the fall of 1907, not one of the 200 fish at the Corry hatchery showed signs of spawning when the brook trout and brown trout spawned, and we are now awaiting curiously to see whether the fish will spawn in the spring along with the rainbow trout, or whether the hybrid will prove barren like the mule.

There is a general belief that hybrids are nearly always barren. As a matter of fact the opposite is the case. The mule is one of the very few instances in which barrenness results from hybridization.

One of the purposes in hybridizing the brook and brown trout was to produce a fish about the size of the brook trout which would thrive in waters in which brown trout would live and which had become too warm for brook trout; streams, for example, which are found in abundance in Delaware and Lancaster counties.

Even though the hybrid should produce eggs later in the season, the purposes for which the fish was bred has not been realized. The hybrid has proven to be much larger than a charr or brook trout would be at the age of three years, and hence is not suitable for distribution. If the hybrid should prove fertile it will be crossed with the brook trout and another effort made to bring it to a proper size. This will naturally cause another delay of three years.

WORK ON THE HATCHERIES.

Every one of the hatcheries, operated by the State made a distribution of fish during the year. This is the first time that none was missing from the list. Spruce creek and Crawford hatcheries were started in June 1906, too late for the superintendent to turn out any fish that year, so that the output for 1906 was from six hatcheries. As both stations are primarily for the propagation of

bass, it was not expected that they would be able to make a very heavy record in 1907, and the results therefore are very satisfactory. The sum of \$10,000 appropriated by the last Legislature was expended on Crawford, Spruce Creek, Bellefonte, Wayne and Torrerdale, giving them all good starts, and much was done towards improving the other stations.

CORRY HATCHERY

The Corry hatchery, known under the old Fish Commission, which preceded the Department, as the Western Hatchery, is the oldest establishment in the state. It was purchased more than thirty years ago and is designed almost exclusively for the propagation of brook trout. When there were but three hatcheries, the bulk of the State appropriation for several years was expended on this station, and through the pride and hard work of the superintendent it was built into a beautiful park and was the pride of the people of Erie county. For several years before organization of the Department only enough money was expended to actually do the work of hatching and distributing and practically nothing was expended on repairs. As the result, the property began to fall into decay and when it came into the hands of the Department the property was in a deplorable condition. The oldest hatchery house was on the point of falling down. The barn, which about seventy-five years ago was a mill, had to be shored up by large beams to keep it from toppling over. The floor of the No. 2 hatching house was rotten and had given way in several places. The sides of all the ponds were boarded, and the majority of them had never been repaired after being built. The consequences was that not half the full stock of fish could be carried in the ponds. The No. 3 hatching house was the only building in good condition. In the first four years of the life of the Department of Fisheries, I used what little money that could be spared towards repairing the worst of the dilapidation. No. 1 hatching house was remodelled, excepting the troughs; a new floor put in the No. 2 hatching house and the rotten board sides of three of the ponds replaced with tile blocks, and a new dwelling built for the superintendent. This year, having a little more money on account of special appropriation to the new hatchery, I devoted a considerable sum to the remodelling of the Corry hatchery. All the ponds on the front of the property have been reconstructed with tile and concrete sides, and there is sufficient material on hand to reconstruct next summer all the ponds on the property. A new barn was built on the site of the ancient structure, using all the good timber for the sake of economy. All of the hatching troughs in No. 1 hatching house were torn out and the interior remodelled on the most modern lines, by which I not only gained a greater capacity, but only used one-half of the water that was necessary under the old system. A number of other important improvements were made, so many that all of the oldest portion of the hatchery is quite as beautiful and in better condition than the station in its best days. Owing to the dilapidated condition of the ponds in 1906 and also to there being an abnormal number of males, the superintendent was only able to take 3,050,000 trout eggs, and

with eggs sent from other points, was only able to hatch 3,500,000, or at least a million and a half less than the capacity of the station. He was unable to ship even that many because for the first time in the history of that station the little fish were seized with a disease known as sore throat which seized a good many, and only for the skill of the superintendent the loss would have been much heavier. The disease and its possible cause is discussed elsewhere since the same disease attacked the fish in other hatcheries.

The frog work at Corry was a failure owing apparently to the tadpoles having been killed through the carelessness of a subordinate in feeding them with tainted liver during the absence of the superintendent. Some sunfish and bull-heads were also hatched out at Corry. It was expected that the hybrid made by Mr. Buller between the brook trout and brown trout would produce eggs in the autumn of 1907, but on the first of December they showed no signs of ripening. It is possible they may do so sometime during the winter. They should because they are now three years old.

ERIE HATCHERY.

The Erie hatchery is the second oldest fish culture establishment owned by the State. It is located at the corner of Second and Sassafras Streets in the city of Erie. It is on a very small plot of ground, less than a hundred feet square. The hatching house contains two batteries or series of wooden troughs, set one above the other, and fitted up with about five hundred and fifty jars, mostly McDonald pattern. There are a few Downing improved and the Meehan. As the jar method is used exclusively at this hatchery, and for fishes only like white fish, lake herring, wall-eyed pike and pickerel, the annual output is over a hundred million a year. This year it broke all records even with wall-eyed pike. The hatchery is at present under the charge of the superintendent of the Erie hatchery, but cared for by the assistant superintendent. As this entails too much work on the superintendent I believe the station will be benefited by withdrawing the superintendent and placing the assistant in entire charge. This I intend doing in the spring.

From the Erie hatchery alone there was turned out 234,164,846 fish and frogs in 1907, more than double the usual output of all the hatcheries prior to 1904.

The Erie hatchery, although in operation throughout the year, is in reality a field station. That is to say a station which depends on its egg supply entirely from fish taken from the fishermen's nets. It is the only purely field station the Department possesses. The quantity of eggs gathered is so vast on this section from Lake Erie that the Erie hatchery can no longer take care of them all and a great many million white fish, lake herring and wall-eyed pike eggs had to be sent this year to the Crawford hatchery, enough to fill that station.

One of the batteries in the Lake Erie hatchery, built about nine or ten years ago, became rotten and had to be rebuilt, and the ceiling under the great water tank which supplies the hatchery had to be shored up until I can get sufficient sum of money to put in new joists and make the job permanent.

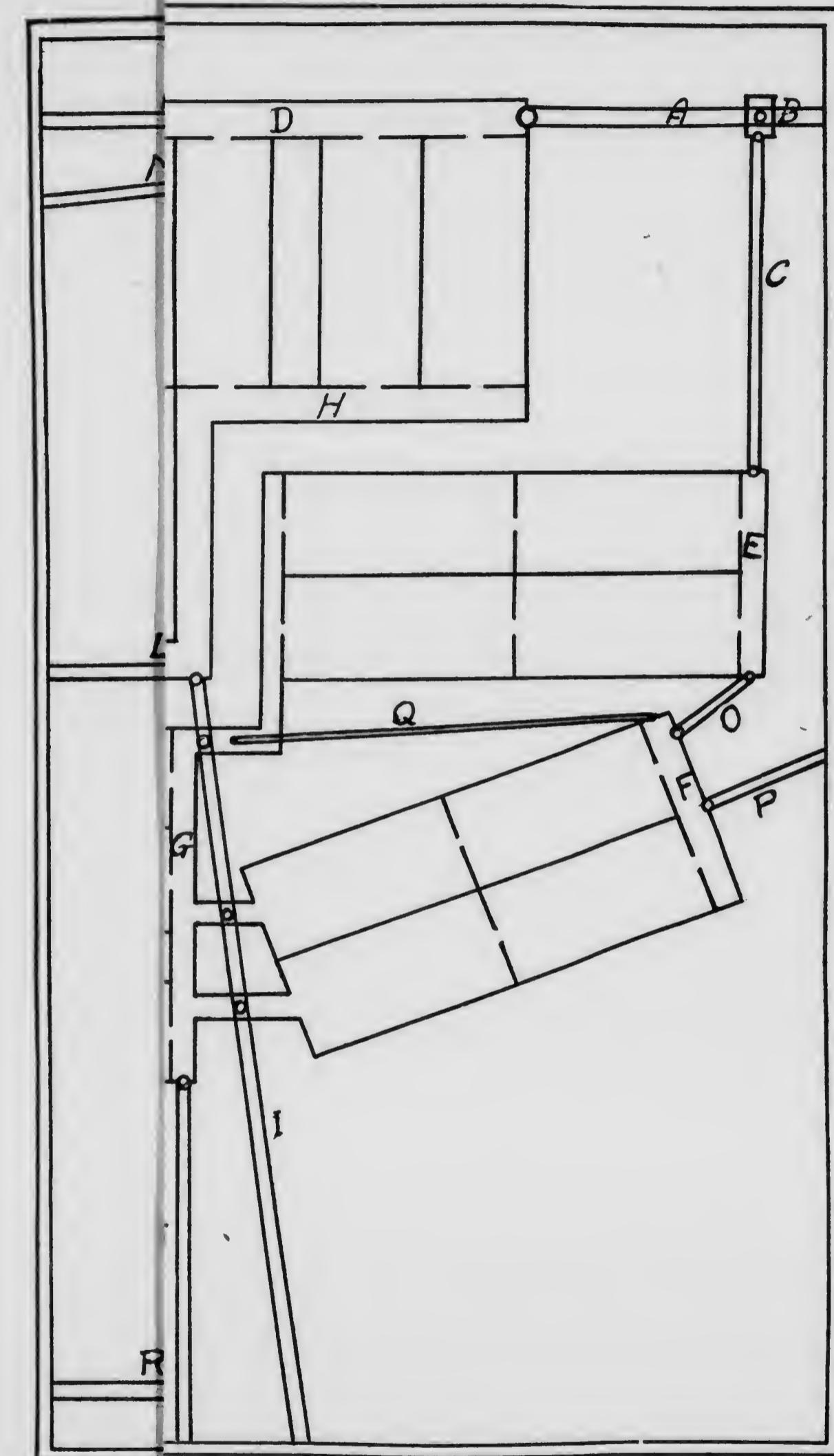
BELLEFONTE HATCHERY.

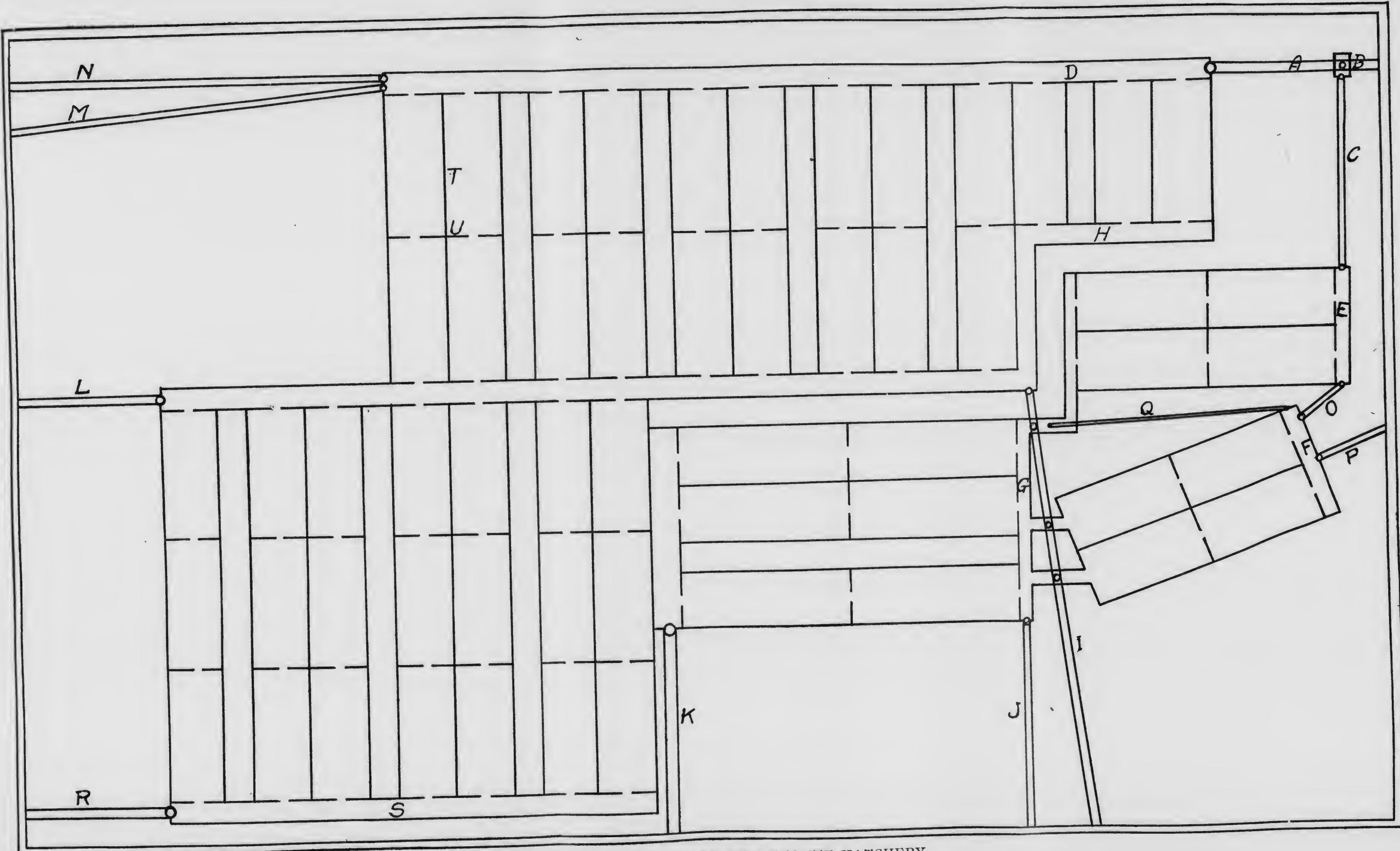
Bellefonte Hatchery Station, No. 3, was established by the Department of Fisheries in the summer and fall of 1903. Believing that temporary work was folly and expensive in the long run, whatever was done on this station was of a permanent character. Every pond has concrete sides and the sluice ways of the same material. It was also planned in such a manner as to provide both for present and future drainage of each pond. There were those who when the station was first established, said that the ground was too flat to make a very successful hatchery. It was predicted that the half a dozen ponds would be the most that could be built. I freely admit that I was entirely responsible for the selection of the site. I had faith in it and my faith has been justified. Instead of the total number of six ponds there are now fifty-nine ponds in this hatchery containing more brook trout, it is said, than any one hatchery in the United States under state or national control. The report of the superintendent and the assistant superintendent of the station shows that by actual count there are 88,741 fish from one to four years old. By this time next year I expect to have, if possible, at least a dozen more ponds or over seventy ponds at this hatchery. Indeed, with the tremendous stocking we have at present more pond room will be imperative. One group of twenty-seven ponds at the lower end of the hatchery now in active use is declared by many practical fish culturists to be the finest and most perfect set of ponds they have ever seen, and it is to this group that fourteen or fifteen more ponds will be added as soon as possible. The ponds in this group are so concentrated that any two may be drawn without disturbing the water supply of the remainder. Instead of six or seven the fifty-nine now built the section now in use is capable of sustaining at least a hundred ponds, and the water supply is ample to build as many more in other parts of the property.

Some fish culturists have pronounced against hard water, or water impregnated with lime for trout hatching purposes. The water at Bellefonte is as hard as any I have ever met with and I doubt if there are healthier fish to be found anywhere than at the Bellefonte hatchery. They are of a better color perhaps at Corry.

As most of the fish at the Bellefonte hatchery are young, the output was less than 3,000,000 in 1907, and will be about the same in the spring of 1908 but with this advantage, in 1908, that two-thirds of the eggs hatched at Bellefonte in 1907 came from other places while in 1908 they are from our own fish.

During last summer I built ten new ponds and capped four others to conform and the grounds were beautified. At this station an attempt was made to rear Atlantic salmon, and a few have been brought to spawning eggs, but unfortunately they are all females. Some rainbow trout is also reared here but to the mystification of fish culturists instead of spawning in February or March as they had in other natural environments they spawn the same time as the brook trout.





GROUP OF TROUT PONDS AT BELLEFONTE HATCHERY.

WAYNE HATCHERY.

The Wayne hatchery is situated in Wayne county in a beautiful valley in the head waters of the Lackawaxen river, which flows through the grounds about a quarter of a mile from the village of Pleasant Mount, and two and a half miles from the nearest railroad station. It was established in 1903 by gift of Miss Alison B. Sterling and James T. O'Neil, of Pleasant Mount. It has been added to subsequently by purchase until there are now about thirty acres of land, most of which is splendidly adapted to fish culture in its various branches and the remainder which is hilly woodland affords protection to the plant.

It is a combination station, that is trough hatching for various species of salmon and trout, pond culture for black bass and a battery station for field fish work.

Wayne county and the adjoining county of Susquehanna contain over two hundred lakes and this affords opportunity for gigantic field work in yellow perch and pickerel.

It is from this section of the state that we gather most of the huge supply of pickerel and perch eggs hatched at all the stations including Torresdale. Wayne is, therefore, one of the most important of the eight hatcheries. While the station is admirably adapted to the quality of the work one of the weak points of the Wayne hatchery is the difficulty encountered in building ponds which will hold water without leaching. The Lackawaxen Creek, which flows through the grounds at one time ran down the east side but gradually cut its way across to the west and as Wayne county was one of the three counties in which the huge mer-de-glace of the ice age wrought the most destruction, the grounds just beneath the surface was a mass of loose and gravelly sand.

There are a number of springs on the hatchery, all small, but when brought together yield about four hundred gallons of water of a temperature of 46 degrees, uniform throughout the year. These springs proved to be not deep springs, but probably leechings from the upper part of the Lackawaxen and the surrounding hills. Under normal conditions, notwithstanding this fact, there has never been a diminished supply of water and never a variation in the temperature. The one exception in the variation in supply occurred last winter and it was this variation which proved conclusively that the water did not come from deep springs. The winter temperature of Wayne county is very low in places. In Mount Pleasant township the temperature frequently is between 28 degrees to 30 degrees below zero, and below that even. Last winter for more than six weeks the thermometer never rose above zero. At the end of about ten days there was noticed a diminished supply of water from the spring and the supply continued to diminish until it fell at the rate of twenty-five gallons per minute. A pipe which carried an additional supply of water from the hatching house to the creek froze solid, so that there was only the thirty-six gallons mentioned to supply 3,000,000 trout. It is to the credit of the superintendent and his men that by working night and day these fish were saved, excepting about 300,000. It was done by placing aerating apparatus at out-flows and in addition to hand aeration kept going

night and day until the water flow returned to its normal state, which was about four weeks later. An examination later on indicated strongly that surface water leeching into the fissures through which the spring water flowed, froze and choked them up.

On account of the small spring water supply it is not possible to have very many breeding brook trout at this establishment, and most of the eggs therefore must come from other stations or other plants. The take this year from our own fish at Wayne was 300,000, but about 1,700,000 were shipped in from Weissport, Penn Forest and the Blooming Grove Hunting and Fishing Club. The field work carried out in connection with Wayne produced about 168,000,000 pickerel and 113,600,000 yellow perch fry and the shipment of 40,000,000 pickerel eggs and 44,000,000 yellow perch eggs to the other stations, besides 1,050,000 brook trout eggs to other stations. Black bass work at Wayne was a failure in 1907 so far as distributing was concerned, although over 200,000 fry were gathered by field work and from eggs hatched at the hatchery. The failure was due to the superintendent not succeeding in beginning his distribution before the ponds were filled with algae, the prevalence of a drought which prevented him drawing the pond. Filthy water from a reservoir three miles above the hatchery and canibalism destroyed the entire 200,000.

Frog work was for the first time at Wayne of small dimensions, owing to his having been compelled to abandon the site occupied in previous years as the frog pond, the site being needed for a roadway to the hatchery house. The output was only 10,000.

The Superintendent made a very interesting and successful experiment in sucker culture, the details of which will be found in his report.

I consider the experiment of some importance owing to the fact that while in certain sections the sucker is not thought highly of, it is esteemed in many sections of the state and in those sections there is a demand for the maintenance of a supply. While I personally regard the sucker as a coarse fish I feel that all native fishes which have an economic value be protected and cared for. I therefore intend to continue the propagation of the sucker. A curious feature of the superintendent was that apparently every one of the eggs hatched.

Cut throat trout culture was not successful, owing to the fact that the eggs sent from South Dakota did not arrive in good condition. Owing to the fact that there were many applications for lake trout and wall-eyed pike for this region, for economy sake I ordered eggs of those fishes sent there for hatching and distribution and the work was highly successful.

Most of the work of pond building and indeed most of the work of the Wayne hatchery previous to 1907 was of a temporary character, owing to the very small appropriation made to establish it, but with a better appropriation of the session of 1907 I was able to begin permanent work with the result that a series of trout ponds with concrete sides was constructed.

TORRESDALE HATCHERY.

The Torresdale hatchery was formerly a field station for shad, located at Bristol, Bucks county, on the Delaware river. In 1904 the city of Philadelphia having transferred along a nominal lease of one dollar a year a ten acre tract at Torresdale, the field hatching house was moved thither and turned into a combination hatchery and field station. Of the ten acres only seven were on dry land, three being in the Delaware river, covered by high tide. A small stream flows through the property and by persistent work the seven acres are now nearly filled with ponds, or laid out with grass plots, trees and walks. There is a handsome dwelling house erected by the city of Philadelphia, a commodious barn and other buildings.

Large mouth bass were propagated last spring and a large number of sunfish, cat fish and other pond fish. Over 40,000,000 yellow perch eggs were gathered and hatched and over 5,000,000 shad eggs.

UNION CITY HATCHERY.

The Union City hatchery was established under special act of the Legislature in 1905. The act carries with it an appropriation of \$15,000 for building, provided the citizens of Erie county presented the land necessary, the land being approved by me before acceptance. The people of Erie county, especially of Union City complied with conditions and presented a tract of land about a mile outside of Union City.

One section near the upper end was at once staked out, the section covering about five acres. The section today is completed with a large modern designed hatching house for lake trout, ice house, meat house and ponds for black bass, yellow perch, sunfish, rock bass and calico bass. Grading has been completed and the grounds sodded or sown with grass seed and planted with trees. Walks and drive-ways have been constructed and nearly finished.

A second section of about three acres was staked off during the summer for fry ponds and a battery hatching house. Two of the fry ponds were finished by the first of December and in about two years I hope to have this second section entirely finished.

At this station and Crawford the greatest successes were met with in bass culture. In fact the two stations turned out nearly the entire supply. The report of the superintendent giving details of his work with bass will be found not only interesting but exceedingly instructive. As the battery house had not been erected the few thousand yellow perch eggs gathered at this station were sent to Erie for hatching.

CRAWFORD HATCHERY.

From a huge swamp overgrown with briars, alders and swamp willows, the Crawford hatchery slowly is emerging into a neat and well equipped fish hatching station. The property, twenty-eight acres, was a gift to the state by citizens of Meadville and Conneaut Lake, twenty-five acres having been given in 1905 and three acres last year. Owing to the very small appropriation, \$10,000, having been made by the Legislature for the three hatcheries, it was not

possible to make a beginning at Crawford until June, 1906, and then there was only sufficient funds to clear the land of brush and build a retaining dam across the Conneaut Lake outlet to supply the hatchery grounds with water to build one bass pond, two frog ponds, one fry pond and to partly build one yellow perch pond. Yet with this small beginning the station turned out this year 163,050 fish and frogs, and what is more satisfactory, of this number 32,350 were black bass.

With the appropriation made at the last session of the Legislature it became possible to perform more extensive work in construction. Three buildings, one a dwelling, one a barn and one a battery house, all complete in their details were built. A very large pond for bass was constructed, the yellow perch pond completed and two fry ponds dug. Drains were laid, dykes were built and when certain paths and drives are made the upper section of the hatchery will be completed, very satisfactory work I take it for one year. As it was designed to make the Crawford hatchery in addition to its specific purpose a feeder for Lake Erie, the hatching house was built of a much larger size than it would have been for eggs. It has a capacity for three huge batteries of the Alpena holding 1,050 jars. There is at present one battery built and in operation with 350 jars on the first of December, all filled with white fish and lake herring eggs.

The bass work at Crawford was not only successful but particularly creditable to the superintendent in view of the fact that the first hatching was entirely destroyed through an abnormal fall in the temperature of the water in the middle of June. New breeding fish were at once secured and from 40,000 fry hatched therefrom he succeeded in distributing the 32,350 already mentioned. Reference of his report appended elsewhere it will be seen that as a consequence of an experiment in feeding fry while still on the nests he was enabled to ship fish in thirty-five days which were as large as fish ordinarily fifty days old. The superintendent's success with some fish was also phenomenal, notwithstanding the ravages of disease he reared and distributed a large number of frogs; indeed there is not a failure to be recorded for the Crawford hatchery for the year just ended.

SPRUCE CREEK HATCHERY.

The ground for the Spruce Creek hatchery was broken a few weeks later than that at the Crawford hatchery. At the beginning of the present year there was a bass pond and perch pond, one large fry pond and a number of temporary trout ponds from which there was a small output of fish of the species named. As there was a spring of huge size well located, a hatching house for trout, one hundred feet long by forty feet wide and with 120 troughs set in tiers the same as at Union City was built and a number of well designed trout ponds. An opportunity offering I purchased a piece of ground practically adjoining the hatchery, containing one acre and on which there was a well constructed frame house of eight rooms, another house of five rooms and a small barn, the whole being secured for \$2,250, probably the cheapest property I



CRAWFORD STATION—Bass Pond and Jar Hatching House.



SPRUCE CREEK HATCHERY—Hatching House.

have been able to secure where money had to be paid. I am sorry to say that big spring has given a great deal of trouble, so much that unless some means are found to obviate it water to supply the hatching house will have to be brought from other springs on the hatchery but on the west side of the creek.

The volume of water flowing from the spring when the property was secured, was in the neighborhood of 1,000 gallons a minute. The spring burst out from fissures at the base of the mountain on the east side of the north end of the grounds. In order to secure a proper flow into the ponds for the proposed hatching house without wasting much ground, the spring after being thoroughly cleansed was raised to a height of thirty inches. The raising of the spring caused a back flow and a new outlet formed a little above the upper outlet. This was filled up.

The temperature of this water was about 50 degrees. The water is what is called mildly hard. There was no noticeable change until a few days after the new year, when suddenly and within an hour the volume from the spring doubled and for a couple of days was slightly discolored. About two weeks later there was a second increase nearly as great as the first also accompanied by a temporary discoloration of the water. A week later immediately after a great thaw and melting of snow there was a third and temporary increase, but no discoloration. The third increase did not last for more than two or three days when the water fell to an estimated output of about 3,000 gallons a minute, which volume was maintained on April 1st.

By May 1st the water had fallen to about 2,000 gallons where it remained until the 2d of June when it again increased and was quite muddy. It thus became evident that by the raising of the spring a passageway was opened somewhere underground into another subterranean stream and one which has a surface flow somewhere within a few miles.

In consequence of this variation in the volume it became necessary to both enlarge and raise the sides of the spring. Also to make a spill-way to carry off the surplus water. This was done. Since the summer, while there has been some variation in volume, it has not been material, it remaining on an average of 2,000 gallons a minute.

If the sudden increase in volume and subsequent variations had been all there would have been little to trouble either the superintendent or myself, but with the second increase there was a sudden appearance of a black, greasy-like substance which was carried in suspension through the water in vast quantities. When some of this was placed in a jar, it sank to the bottom, finally showing that it was not grease. Examinations made by the United States Bureau of Fisheries and in this office and by a vegetable biologist showed that the substance was a subterranean algae. It was supposed that the raise of the spring caused an opening to be washed somewhere in its underground passageway into another subterranean stream which contains the algae. An unfortunate feature of the appearance of the substance was that it caught into the gills of the advanced fry, inflamed the gills in some, and produced sore throat in

others, so that all the fish in the troughs were destroyed excepting about 80,000.

The algae decreased in quantity as the weeks went by until by the first of July it was entirely gone. There was a reappearance however, the latter part of November. It appeared, however, slightly different, being both finer and greasier in its character and keeping nearer the surface, but it went low enough to get to the eggs in the troughs, and I am afraid that the loss therefore will be necessarily heavy. It is a curious fact, however, that the fry and advanced fry did not appear to be affected this winter by the substance. It is the eggs only. Fortunately, however, if this algae is to be a permanent feature of this spring it will only require about 300 feet of piping to connect the spring on the west side of Spruce Creek, provided that those springs can be raised to a height of four feet which is believed can be done because apparently the water issuing from them come from near the summit of the steep hills the foot of which begin on the west side of the highway which extends along the west of the creek. If this cannot be done then the water must be brought from a spring 1,300 feet from the hatchery grounds. The water of the big spring can still be utilized for the trout ponds as it does not effect breeding fish or even fingerlings.

Prof. H. M. Ullman, of the Lehigh University, South Bethlehem, having written me that he would gladly analyze any water used in the hatcheries, I sent a sample of the water of the big spring on the Spruce Creek hatchery to him. He promptly returned the following analysis:

	Parts per million.	Grains per gallon.
Total solids,	142.5	8.31
Mineral solids,	127.5	7.44
Organic solids,	15.0	.87
Total hardness, as carbonate of lime (soap test),	110.5	6.45

Concerning the subterranean algae Prof. Ullman wrote: "As to the growth in the water I suppose that it may be Spirogyra, and that it indicates that the water is slow running or almost stagnant."

The water is certainly not slow running as may be measured by the quantity, 2,000 gallons or more, which flows every minute. There may be and it is possible there is a subterranean pool a short distance back in the mountain side where the water would be quiet enough to allow the algae to develop and grow.

From the quantity of solids it might be mentioned by some that the water would be unsuited for trout. As a matter of fact we have no hatchery in which when not bothered by algae the fish grow more rapidly or remain in better health.

AUXILIARY PRIVATE HATCHING STATIONS.

In my last report I argued the desirability of establishing throughout the state auxiliary private hatching stations. That is to say, the utilization of private ponds on gentlemen's places for the rearing of fish for distribution in the neighborhood.

I had received many letters from gentlemen owning private ponds who were anxious to secure fish for them for their own pleasure and who had no knowledge of how to get them. Of course under the law these correspondents could not secure fish from the state, and it struck me that some means might be devised by which they might legally gain their desires and at the same time result in benefit to the state. The idea of auxiliary private hatching stations was evolved. With this idea Mr. Bromley Wharton, private secretary to the then Governor Pennypacker, offered his two ponds on his property in Bucks county as an experiment. The outcome surpassed my expectations. A surprising number of black bass was reared and planted in public waters. The ponds were equally successful this year in rearing sunfish. I am now about to experiment with some ponds for trout on the property of the Hon. F. P. O'Connor, Judge of the Cambria County Court. During the summer and autumn, Judge O'Connor began the construction of several ponds on his property in Somerset county on plans prepared by me and they will be stocked with trout for breeding purposes in the spring of 1908. The plan in this case is to rear the fish to breeding age, take the eggs and transfer the surplus males to another pond and the owner of the property given permission to take them in the ordinary legal method, but the breeding females not to be disturbed or caught until they cease to be economical for breeding purposes. I have several offers under consideration, some for rearing sunfish in sections where this fish are in demand and not easily reared from the hatcheries, and one or two for black bass. Mr. Wharton's plant is under the supervision of the superintendent of the Torresdale hatchery, but under the terms of the understanding by which the ponds are used, all the expense and work are borne by Mr. Wharton, excepting the gathering and planting of the young fish, which is taken charge of by the superintendent of the Spruce Creek hatchery.

DEATH AMONG YOUNG TROUT.

For the first time in many years there was a serious death rate among the young trout in the different hatcheries of this State in which this species of fish were reared.

The trouble began about the last of February when the troughs were crowded with the little fish. The curious feature connected

with the trouble was that in three hatcheries out of four the original cause was different, and it is also curious that the trouble was almost simultaneous in the four hatcheries. The first announcement of trouble came from the Spruce Creek hatchery, where Mr. Haas, the Superintendent, reported that a vast quantity of a greasy floating material had appeared in the spring and that it was getting among the gills of the trout fry and killed them. There were about 800,000 in this station.

Less than a week later Mr. Wm. Buller, Superintendent of the Corry hatchery reported that the fry in his station were dying in vast numbers from a disease known among fish culturists as "sore throat." The superintendent stated that a large quantity of snow water had gotten into the spring, and that the fry "went off their feed," and then contracted the disease.

The same mail brought a letter from Mr. Nathan Buller, Superintendent of the Wayne hatchery, announcing that his fish had become very weak and were dying on account of an insufficient water supply. He reported that there had been a prolonged spell of extremely cold weather, which caused the water pipes carrying water from the Lackawaxen Creek to the troughs to become frozen solid, cutting off completely the supply of water from that source. Second, that somewhere above the spring the crevices had become frozen, decreasing the supply of water from the spring from more than 200 to about 30 to 40 gallons a minute. At the time of writing he had only about this amount to supply 3,000,000 fry.

Twenty-four hours later I was called over the telephone by Howard Buller, Superintendent of the Bellefonte hatchery, to report that the fish in his hatchery had become weakened through a deficiency in oxygen and had contracted "sore throat," from which thousands were dying.

Here were three distinct causes relating to death. An investigation of the trouble at Spruce Creek developed the fact that the greasy substance which had gotten into the spring was an algae, which thrives only in darkness. I ordered the covers to be taken from the spring, and to my amazement found that not a particle of algae was on the bottom, and that it was floating through the fissures which supplied it. It was therefore evidently drawing in some subterranean place and therefore entirely beyond control.

Notice was given to the Superintendent, and to the other superintendents to begin shipping, knowing that if the young trout could be safely deposited in the streams the trouble would cease and the fish recover. Before the fish could be distributed all had died at Spruce Creek, excepting 80,000.

The trouble in the hatcheries among the fish was published broadcast throughout the State, and the reason for shipping at once, regardless of weather conditions, were also given, and it is a pleasure to note that of the nearly 4,000 applicants there was only one applicant who protested, and he did so only because he had not heard of the epidemic. On learning the cause of early shipping he at once withdrew his protest.

With the thinning out of the troughs the disease at Corry and Bellefonte began to abate, and the fish began to take food more freely.

By April first the trouble had almost entirely disappeared in those two hatcheries. At the Wayne hatchery the Superintendent and employes employed every means possible to avert complete disaster. Aerating apparatus were employed to force oxygen into the small water supply, and with some good effect. Further aid was given by hand aeration. Fortunately after a little more than two weeks the spring began yielding its normal supply, and with the thinning of the fish from the troughs through shipping the young trout remaining were soon in a normal condition of health.

It is curious that the "sore throat" disease at Corry and Bellefonte were of a different character at each station. At Bellefonte it was the red spot on the throat which is often found on lake trout fry, but at Corry hatchery the color was a dull orange. The usual remedies were tried, but with very little effect. Salt, the fish culturists great panacea proved the best effect, but even that was scarcely perceptible.

To the energy and ceaseless work of the Superintendent belongs the credit of keeping the mortality down to the proportions that they were. It is interesting to note that the trouble first broke out among fish which were hatched from eggs received from a private hatchery. The fish from which the eggs were taken were known as "forced fish," about 22 months old. An unusual number of "ringers" were noticed among the eggs, and the fish which hatched were not as strong as those hatched from eggs of fish which were normal fish. They were the first to stop feeding, the first to contract disease, and the first to die. Undoubtedly, even though there had been no fish of this character in the hatchery, the disease would have appeared just the same. Death was inevitable from the algae. Disease and death were inevitable among fish weakened through an insufficient amount of oxygen.

COMMERCIAL TROUT HATCHERIES AND THEIR SURPLUS EGGS.

I am pleased to say that the number of trout hatcheries is increasing, notwithstanding the unjust and burdensome laws which now restrict their usefulness and development. Two were added to the number last year and three others it is expected will be started in 1908. There are six good sized plants now in operation of this character. Most of them having surplus eggs gave them to the state, the only condition being that skillful spawn takers be sent to gather the crop. The state was the gainer thereby by 3,500,000 eggs. It is a benefit to the fish to take their eggs and occasionally it is a benefit to the commercial hatchery to have experienced spawn takers assist their men. Nevertheless, I feel that it would be better if the state were to appoint a sum of money specifically for the purchase of surplus trout eggs at the commercial hatcheries in Pennsylvania. The price per thousand might be said to be less than the market rate on the ground that it was surplus

eggs only that would be purchased. By paying a small sum it would be an encouragement to the owners of commercial hatcheries to keep their stock to the highest limit knowing that the surplus eggs would be disposed of and not be lost.

NEW WORK UNDERTAKEN OR PROJECTED.

Since the creation of the Department the following is the work undertaken which had either never before been attempted, or only on a small and experimental stage:

The propagation of frogs, the chain pickerel, the sunfish and the catfish.

These were entirely new ventures, the yellow perch and black bass, which had before only been experimented with having either made complete success or placed them on a fair working foundation. I have projected other and important work to be begun either in 1908 or at the earliest possible moment. Among them may be mentioned the propagation of suckers, of chubs and fall fish, of fresh water pearl and edible mussels, and fresh water terrapin.

Of the first, namely, the suckers, I have treated elsewhere. The fresh water mussel will be the next extensive experimental work. Its success will mean thousands of dollars to the State of Pennsylvania, and prove a great boon to the people.

Several fresh water mussels are notable pearl bearers, and in several parts of the country are already of great commercial importance. Census figures show that in 1905 the value of the fresh water pearl button made in the United States was near \$5,000,000. Of this amount New York was credited with \$1,813,167, while Iowa had \$1,500,949. Iowa had at that time 51 factories for the manufacture of buttons from the pearl mussel, although New York had only 26 but larger establishments, but the bulk of the industry is said to be along the Mississippi valley. This industry is from the shell alone while the pearls which are yielded have a greater value.

As far as I know I believe there are three species which have a special value either for their pearl bearing qualities or for their shells for the manufacture of buttons, or both. One is known as the Margaritana Margaritifera, a second is the Lampsilis Ventrucosus, commonly known as the pocketbook, and the third is the Lampsilis Luteolus.

The first named is peculiarly adapted for cultivation in many of the trout streams of this state. Its value is almost wholly as a pearl producer. The gems are of good lustre and are found very plentifully. At the present time there is as far as known only one stream in Pennsylvania in which the Margaritana is found. It is a trout stream in Schuylkill county, but seekers after pearls have so depleted the stream that last year (1907), my collectors were unable to find a single live specimen, though they found many shells.

The two Lampsilis are mussels which thrive best in warmer waters and should do well in streams like the Susquehanna, Delaware, Allegheny and their tributaries.

The Lampsilis Ventrucosus, or "pocketbook," is an excellent button shell and is also to some extent a pearl producer.

The Lampsilis Luteolus is a smaller sized mussel of less value for the manufacture of buttons, but is a better pearl producer, so it is said.

Through the courtesy of the United States Bureau of Fisheries I received a number of specimens of all three. The Margaritana from Massachusetts, and the two Lampsilis from the Yellow river, Indiana. These mussels were planted in two of the ponds in one of the hatcheries and next year another and larger supply has been promised by the United States Government.

For the present I shall simply permit the mussels to propagate naturally, but, as soon as possible, I will experiment with a few by propagating them if possible by artificial means, similar to those employed in the propagation of the oyster.

On account of the great value of the mussels as a pearl producer and because I believe that better and quicker results will be achieved it is not my intention to make the earliest plants by granting applications as is done for fish, but to plant them directly by the employes of the Department in the most suitable water and locations. Of course the outcome of this work is as yet purely problematical, though I hope my next report will show success in rearing mussels in the hatcheries.

Before leaving this subject I would like to quote a portion of an article which appeared in the Chicago Examiner last summer concerning the fresh water pearl industry in the Canadian Wilds. It follows:

"In the mighty streams flowing through Ungava, Canada, a profitable pearl industry is carried on among the Indians and Eskimos.

"Barrenness and desolation, rocky shores beaten by an icy sea, long winters and short inclement summers are the chief characteristics of that northern land. Signs of human life are scarce and at intervals may be seen rude huts or rocks erected by whale and seal hunters long since departed for more profitable fields. In the long rushing waters of the streams which empty into the sea pearls are found hiding in the shells of the mussels which are often so plentiful as to partially block the river.

"Unlike the pearls of Ceylon they are snowy white, nevertheless of the finest quality, although a certain percentage are irregular in shape. At the present time several hundred men are engaged in hunting for the pearls. They collect the mussels and pile them in heaps where they are left until decomposed and then the pearls are easily extracted from the shells. Several large jewelery houses send travelers on periodical visits to buy these pearls, and of course the Hudson Bay Companies' traders get a fair share of the gems."

FRESH WATER TERRAPIN.

My feeling for the propagation of the fresh water terrapin has been strengthened by numerous reports which have come to the Department that this valuable aquatic food is rapidly disappearing. In

quiry among dealers confirmed these reports and offered as proof a rapid rise in prices. One dealer declared emphatically that unless the State undertook their propagation the fresh water terrapin would soon be as scarce and valuable as the Diamond Back.

There appears to be five species in the waters of Pennsylvania of which two, the green head and the red legged are the most esteemed. A few bulls and heifers of the red legged species have been secured, and I have arranged to obtain a few dozen of both species in the spring where the first attempt at their propagation will be made at the Spruce Creek Hatchery, where both the soil and water conditions appear to be most favorable.

I suppose if the Department were to undertake the propagation of snapping turtles there would be a loud protest from many parts of the State, although the propagation has been urged by a few. I have no doubt whatever that the time is coming and is not far distant when there will be a well-concerted movement for the propagation of this valuable turtle, but at present I believe there is no real necessity for undertaking it.

FIELD WORK.

It seems scarcely necessary to expand upon the tremendous importance of field work or the gathering of eggs from fishes which have been caught in the nets of commercial fishermen or which have been deposited naturally by the fish in the lakes and rivers, and also under some circumstances the gathering and protecting in their earliest stages the fry of some fishes, notably the black bass.

The work and results speak for themselves. Of the more than 666,000,000 fish hatched and distributed by this State last year nearly if not quite 650,000,000 were the result of field work.

One hatchery, that at the City of Erie, is sustained exclusively by field work. The principal results of the Torresdale hatchery are from field work, and the same may almost be said of the Wayne hatchery, and the Crawford hatchery will undoubtedly in the near future be principally sustained by the same means. Thus we have one-half of all the hatching stations under the control of the Department of Fisheries sustained in whole or in part by field work.

This problem of fish cultural work is the most important because it aims to save the waste. All of the eggs secured from fish caught by the commercial nets would be lost were it not for field work, and 95 per cent. of the eggs naturally deposited are lost if they are allowed to remain where deposited by the mature female. Of the eggs thus gathered from 60 to 95 per cent. are hatched depending upon the saving. The smallest percentage being that of the wall-eyed pike; 75 to 80 per cent. of the white fish and herring are hatched; 90 per cent. of the shad and 95 per cent. at least of the yellow perch and chain pickerel.

By this saving of the waste the white fish industry in the waters of Lake Erie under the jurisdiction of Pennsylvania has been restored to a paying basis. The yellow perch and pickerel are becoming abundant in waters hitherto either entirely or nearly depleted by the same means.

If the nests of the black bass could be cribbed when the eggs are first hatched and the fry cared for until the sacs were absorbed and the fish were 30 days old there would soon be a vast increase in this valuable game and food fish in the waters of the Commonwealth.

Unfortunately the amount of money appropriated only permits this class of work to be conducted on a small scale. For example, with the exception of about 40,000,000 eggs gathered from fish retained in a rearing pond at Torresdale all of the yellow perch eggs were gathered from four out of the 500 natural mountain lakes of Pennsylvania. All of the pickerel eggs hatched in 1907 were gathered from the same number of lakes. Until this year all the white fish and lake herring eggs were gathered from one field on Lake Erie, and that in Ohio waters. A small appropriation this year enabled me to add to the Pennsylvania field which rendered an additional 35,000,000 lake herring eggs. With a larger appropriation I could treble or quadruple the annual output of white fish and lake herring. With an addition to the appropriation the output of yellow perch and pickerel could be increased many fold. The shad work could be successfully expanded and many hundred of thousand black bass saved.

In order to carry on field work properly there should be a special appropriation as large as that which is now made for the operation of the hatcheries so that a crew of competent men could be employed throughout the entire spawning season of the various types of fishes. If this were done it would be billions and not millions which would be turned out annually by the Commonwealth of Pennsylvania into its waters.

BOATS FOR FIELD AND PATROLING WORK.

At the last session of the Legislature the sum of \$6,000 was appropriated for the construction of a steam tug for the use of the Department of Fisheries on Lake Erie. The specific purpose of the tug was for the extension of field work for patrol work to enforce the fish laws on Lake Erie and to keep in place the buoys marking the boundary line between Pennsylvania and Canada.

A contract was awarded to an Erie firm for the construction of such a boat for the sum of \$3,585, the boat to be complete and ready for use and equipped with every appliance demanded by the Marine Laws. The boat is to be 70 feet long with a 15 foot beam and have a speed of ten miles an hour. Perfect seaworthiness was required in preference to speed and ten knots was as much as could be obtained for the money appropriated and taking into consideration the importance of the boat's ability to withstand the terrific storms of Lake Erie. This means a boat which would be serviceable anywhere on the Atlantic Ocean and almost under any conditions. The boat is to contain accommodations for the crew, a warden and the

fishery officials when it is necessary for them in the pursuance of their duty to be aboard. One important feature is a commodious spawning room where the eggs of the fish are cared for and in which are kept a number of tanks for conveying fry for planting. The boat is fitted up, of course, with life boats, life rafts and more than the number of life preservers called for by the Marine Laws. The boat is to be completed by the 1st of June, 1908.

The Iroquois Club of Crawford county has made a gift to the State of a gasoline launch for field and patrol work on Conneaut Lake, the largest interior lake of Pennsylvania.

The field work to be performed by the means so generously given by the Iroquois Club is for the Crawford hatchery at the town of Conneaut Lake. The total condition of the gift was that the State should maintain a warden for Conneaut Lake during the months of April, May and the first fifteen days of June, a very reasonable condition, since a warden by all means should be maintained on that lake during the period named owing to the large number of illegal fishermen who are attracted to this body of water on account of its plentitude of fish life.

THE FISH CAR.

The various railroad companies recognizing the importance of fish cultural work of the State carry the fish hatched at the various hatcheries in the baggage car of nearly all the trains to the applicants without cost.

With the yearly increased outputs from the different hatcheries the capacity of the railroads in this respect is about reached, and, if the increase continues it will be necessary to use not only the fish car belonging to the Department, but have one or two more built.

Owing to the cost of operating the car which is 40 cents a mile for the round trip it has hitherto been impossible for the Department to make frequent trips with the car which is stored in a barn built for the same at the Bellefonte hatchery.

On account of the restricted financial resources of the Department it will be necessary to operate the car at least three or four times in the spring of 1908. It would be a great saving in many particulars and fish could be more promptly sent out to applicants if a specific appropriation was made for the operation of the car. Nearly 300 cans can be sent out on a single trip or five times the number that can be sent out in a baggage car at one time, thus, if the car could be used the entire stock of trout could be shipped from the Bellefonte hatchery in about four trips making use of course of the baggage car for small lots on branch roads.

AQUARIUM FOR PHILADELPHIA.

For ten years I have been an advocate of the establishment of an aquarium in the City of Philadelphia particularly for the display of Pennsylvania fishes.

The great success of the splendid aquarium in Battery Park, New York, and of the smaller but exquisite display of the aquarium in the United States Bureau of Fisheries in Washington, made me desirous that a similar and equally successful institution be operated in Philadelphia.

Those who have seen an aquarium do not hesitate to say that an aquarium has a greater attraction for the masses than even a display of live wild animals. With the movements and life history of the land animals the public are more or less familiar, but the life history of fishes is a sealed book to most, hence their movements in an aquarium have an almost mysterious attraction.

The educational value of an aquarium is great. The aquarium in New York is constantly filled during the daylight hours with visitors, and a similar institution should be maintained in Philadelphia by all means.

In 1905 the Legislature authorized me to permit the City of Philadelphia for the use of the tanks which held the fish in Pennsylvania's exhibit at the World's Fair at St. Louis for the establishment of an aquarium. It also authorized me to furnish it from time to time with such Pennsylvania fish as could be spared. A proposition was made at the time by some people interested in Philadelphia to establish the aquarium at the Zoological Gardens, but I was forced to point out, as also were the officers of the Zoological Gardens, that there being an admission charged the State's plant could not be placed there. The matter then drifted along until this fall when another effort was made with the assistance of Henry F. Walton to secure a site and have the City of Philadelphia make an appropriation. Mayor Reyburn and Director of Public Safety Clay became very much interested in the proposition and the former suggested a portion of one of the buildings of the Commercial Museum in Philadelphia as a suitable site and agreed that he would support the introduction of an item for \$20,000 in the Mayor's budget to the Commercial Museum for the installation of the plant. Unfortunately as the City seemed to be facing a big deficit the idea was subsequently cut from the budget and the matter will therefore have to lie over for another year.

LEGISLATIVE FISHERY COMMISSION.

As the laws relating to fish on the Delaware river were in great confusion owing to different legislation by New Jersey and Pennsylvania a Commission was created in 1905 to meet a similar Commission, appointed by the State of New Jersey to secure, if possible, uniform laws.

A uniform bill was drafted and in the closing days of the session passed the Pennsylvania Legislature. Unfortunately Governor Penupacker felt it his duty to veto the bill on several grounds, one of which was that it was special legislation.

A second Commission was thereupon appointed under a new resolution at the Session of 1907 and the scope of this Commission was broadened so as to meet also similar Commissions to be appointed by the States of New York, Maryland and Delaware.

The personnel of the Commission was Speaker pro tempore of the Senate, Senator Algernon B. Roberts, Senator Fred. A. Godcharies, both appointed by the Speaker pro tempore. Speaker Frank B. McClain, of the House of Representatives, Representatives James N. Hunter, Hiram J. Sedwick and Alfred Marvin, appointed by the Speaker of the House. Henry F. Walton, Ex-speaker of the House, appointed by the Governor, and Wm. E. Meehan, Commissioner of Fisheries.

A similar Commission having been appointed at the last session of the Maryland Legislature the two bodies met first in Maryland and second in Pennsylvania where proposed Legislation agreeable to both Commissions was framed and will be introduced in the Maryland Legislature this winter where it is said it has a fair chance for enactment.

The salient features were first to prohibit the transportation of undersized black bass from either State during the close season. Second, to prohibit the transportation of yellow perch less than seven inches in length from either State at any time of the year. Third, the regulation of matters in the Chesapeake and Susquehanna. Fourth, the authorization of the Commissions of Maryland or Pennsylvania to enter the waters of the other State and gather fish eggs for hatching purposes, provided a certain portion of the fish hatched be returned to the waters of that State.

A resolution to form a Commission to meet the Pennsylvania Commission is to be introduced at the opening session of the New Jersey Assembly and also a resolution to be introduced into the New York Assembly when that body convenes.

FISH PROTECTIVE AND FISHERY SOCIETIES.

The various protective associations of the State have given inestimable aid in fish protective work. Composed mainly of enthusiastic sportsmen and fishermen they have participated actively in enforcing the fish laws. They have by their example, their attitude and campaigns of education done even more than the wardens toward reducing the number of violations of the fish laws. Whenever I felt it necessary to call upon a particular association for assistance in any specific matter relating to fish protection or fish planting it is seldom that I have not instantly received an enthusiastic and valuable support. So uniform has this been the case that I

could not mention one organization as being more earnest or progressive than another. On one occasion to be mentioned hereafter, I had need in a semi-official capacity to call upon the various fish protective societies of the State for financial aid to conduct a case which because of its method of being brought before a county court could not be taken up to the Superior court by means of money appropriated by the State and yet the case was one in which the State as well as all anglers were vitally interested. Many of the societies promptly and liberally responded. One of them, the Pennsylvania Fish Protective Association with headquarters in Philadelphia made itself responsible for all the money required which could not be collected and in addition placed its lawyer at my disposal to co-operate with the counsel already engaged.

The Pennsylvania Fish Protective Association is the oldest organization of the kind in the State and wields a potent influence in fish matters throughout the Commonwealth, indeed it holds as a principle in its charter the upholding of the laws in regard to fisheries in all parts of Pennsylvania.

It has membership in most of the counties and it is tireless in its efforts to secure and have enforced legislation which will improve the angling.

AMERICAN FISHERIES SOCIETY AND NORTH AMERICAN FISH AND GAME PROTECTIVE ASSOCIATION.

It is natural for organizations to combine either through individuals or as an organization into national and international societies. This natural tendency has resulted in the formation of the North American Fish and Game Protective Association and the American Fisheries Society. The first named is an international organization; that is of the Dominion of Canada and the United States. Although a young society it is doing a splendid work in the direction of fish and game protection. The other is a national organization founded thirty-five years ago. Originally composed of fish culturists it has recently broadened its scope to embrace fish protection as a necessary adjunct to fish culture. It meets annually and this year the gathering was in Erie, Pennsylvania. Next year it meets in Washington, D. C., in conjunction with the International Fish Society, to which the Governors of the various States have been invited to send delegates.

FEDERAL CONTROL OF WATERS.

One of the most important subjects brought before the American Fishery Society at Erie was that of Federal control of waters forming a boundary line between two states or of lakes over which states and the Canadian government exercise jurisdiction. It was asserted by those who advocated Federal control that experience showed the impossibility of securing adequate and uniform fish protective laws. Lake Erie was cited as a conspicuous example of this kind of failure. It was pointed out that of the three states and Canada which surrounded the lake there were no two governments which had exactly the same laws. That while three, New York, Pennsylvania and Ohio had nearly uniform laws they were still not exactly alike and that

Pennsylvania and New York and Canada had no closed season, leaving Ohio alone in that particular; that Pennsylvania did have a closed season, but repealed that law on the failure of New York to enact a similar measure. It was held that by Federal control only could proper laws be enacted. A resolution was therefore unanimously adopted instructing its executive committee to enter into correspondence with the various States having boundary waters, urging them to enact legislation ceding their control of the waters to the Federal Government for fish protective purposes. A resolution was also adopted directing the chairman of the executive committee to urge the Federal Government, the Province of Ontario, the Dominion of Canada and the States bordering on the Great Lakes to appoint delegates to a national conference to assist efforts to induce the States to cede Federal control and to recommend a national treaty and laws uniform for the fisheries of the Great Lakes.

Having been appointed by the American Fishery Society chairman of the executive committee I at once commenced corresponding with officials of various states, looking towards the formation of an international conference and to the present time I have had a cordial acquiescence on the part of all excepting the authorities at Washington, which concurrence will I hope be obtained shortly. Two of the States have ceded Federal control. I am firmly convinced that the only solution of the question of proper fish protective laws is to be found in the manner suggested by the American Fishery Society.

IMPORTANT DAMS.

Work on the dam being constructed across the Susquehanna river near McCall's Ferry was suspended early in the autumn owing, it is said, to financial trouble in New York City, resulting in the suspension of certain bank and trust companies, and in which city it is said lived those who were financing the venture. It is stated, however, that active work is to be resumed in the spring as soon as the water on the Susquehanna will permit, and it is claimed that the dam will be completed and the power plant for the operation of which the dam was conceived be ready for operation by the summer.

The dam and power plant is being built for the purpose of supplying light and power to cities, towns, trolley corporations and industrial establishments within the radius of forty miles. This brings Baltimore, Lancaster and possibly Harrisburg within the zone. Legal proceedings to test the right of the corporation to erect this plant were brought through the efforts of this Department by Attorney General Carson in the Dauphin County Court. That tribunal after hearing both sides, decided that the dam and plant might be constructed under certain conditions, among them was one that fishways both as to pattern and number, approved and ordered by the Commissioner of Fisheries should be erected and maintained by the Power Company. Early in the summer the officials of the

company notified the Department that it was ready to fulfill these conditions. A conference was held at McCall's Ferry, where the plan and power house were thoroughly inspected. Plans of several types of fishways were submitted by the company to the Commissioner, who did not, however, give them his full approval, and produced plans of the Cail fishway, one of the two adopted by the Department, which with certain changes to conform with the construction of the dam and the trend of the river and with certain improvements suggested by the engineer in charge was adopted. Although the company thought two fishways were sufficient the Commissioner insisted on four to be set in the form of a nest on the Lancaster county side of the river. The Company cheerfully agreed to comply with every requirement of the Department and a few weeks later presented complete plans with all the changes and improvements suggested in the original plans included therein. Among the improvements was one which provided at the intake for several gates, the opening and closing of which would prevent a too free flow into the fishway, no matter how high the water might be and insure at all times an equitable flow of water and free passage of fish.

The fishways will insure free and easy passage of fish who wish to ascend or descend the river and beyond the dam, and I have no doubt that most species will use the fishways freely. It will secure the maintenance of the eel industry which, notwithstanding unwise denunciation by some who look upon the fish from a narrow or prejudiced standpoint is a matter for public congratulation. I am afraid, however, that the building of the dam will doom the shad industry of the Susquehanna above that point. The shad is a very timid fish unless a dam is very low and the fishway therein covered with algae and darkened by water will not pass through freely. According to letters received at various times no fishway has been devised which will induce shad to pass the Holyoke Dam in Connecticut. The structure is nearly if not quite as high as the McCall's Ferry Dam.

As the court has decided that the McCall's Ferry Dam could be constructed the possible loss of the shadfishing must be faced and the only course to be followed is to heavily stock the water above with some important food fish which will take their place, and fish which can be taken by means of nets as shad are. I have not as yet decided which is the best available fish for this purpose but have hopes that one will be found, especially since the water retained by the dam will back for nearly eighteen miles, making a huge lake nearly a mile wide.

A dam twenty-six feet high has been built across the Juniata River at Warrior's Gap above Huntingdon, by a company that has established there a plant to furnish light and power to the region thereabouts. It was completed and the plant put in operation in the fall. The water is backed for a distance of nearly three miles. The company cheerfully complied with the requirements of the Department and erected in the dam a fishway. One such device was considered by me as sufficient for a stream the size of the Juniata. In this instance I departed from the usual rule and instead of directing a fishway of the Cail pattern, or the Rogers, to permit the building of a type known as the concealed fishway, a structure

which with the exception of the inlet and outlet is entirely within the walls of the dam. By permitting this form of fishway the pool construction which is somewhat similar to the pool construction of the Cail, is set zig-zag and in such a manner as to give an incline of one foot in five, ample to permit any species of fish, however weak to pass up or down with ease.

Little more than a year ago I ordered a fishway built in a reconstructed dam in a stream in Bradford County. The owners of the dam although its contractor promised to construct the fishway ordered, neglected to do so. When the neglect was discovered, it was found that the owners had sold the plant connected with the dam to the man who had reconstructed the latter. He was notified of his liability and ordered to build a fishway at once. He responded that he was financially unable to do so, that the cost, some \$1,800 or \$2,000 would ruin him. In this statement he was supported by several reputable citizens in the county, among them the Attorney who served on him the legal notice of the Department to construct the fishway. Meanwhile, petitions were received from citizens in the neighborhood strongly calling for the building of the fishway. I then made a personal investigation and am convinced that the erection of the fishway, at the expense of the owner, would at least cost him great financial distress and probably financial ruin. The important matter, however, to be considered in connection with the matter is that the man was fully cognizant of the order of the Department to the concern which rebuilt the dam and indeed was the contractor who rebuilt the dam, who received the plans of the fishway and who wrote that the orders of the Department would be carried out. He knew also that the orders of the Department were disobeyed and that the State was defied, and in purchasing the dam must have known that he assumed the liability. On account of this view point he naturally loses much sympathy for the position in which he is placed. Had the fishway been constructed when it was originally ordered the cost instead of from \$1,800 or \$2,000 would have been scarcely nothing. Certainly not more than a couple of hundred dollars, the cost of the additional lumber required, because it would have been a part of the construction of the dam. Other fishways ordered by the Department the previous year and the period for the construction of which has been extended to 1907 on account of unusual high water were built within a reasonable time.

LABOR PROBLEMS IN THE HATCHERIES.

Six of the Hatcheries are in charge of a Superintendent, one in charge of a Superintendent and an Assistant Superintendent, and one in charge of an Assistant Superintendent.

These men are all skilled fish culturists, surpassed in this particular by none in the country. We have several Assistants who to-day have considerable skill in this important work, but skilled

fish culturists are scarce. The hard work and often times long hours, together with the years required to produce skill, discourage many from entering the business permanently.

In three of the Hatcheries last spring some assistants were engaged. Two or three of the laborers got it into their heads that because they were employed by the State they were not required, or not expected, to work as faithfully, or as hard, as they would if they were working for a private individual. As these men failed to perceive their error on its being pointed out to them, they were promptly dismissed and their places filled by men who had a greater conception of their duty to the State.

RELATIONS BETWEEN THE UNITED STATES GOVERNMENT AND STATES.

The very cordial relations which have existed in the past between the United States Government and State Governments in relation to fishery matters have been, if anything, strengthened during the year. An understanding has existed for a long time by which the United States Government gathers the eggs of the white fish and wall-eyed pike in Ohio waters of Lake Erie of which a proportion of the whole comes to Pennsylvania, this State paying its pro rata of the cost of gathering. This understanding was entered into in the first place for two reasons:

First, because when the State previously sent its own spawn takers into the field there sprang up a rivalry which developed into indications of ill feeling between the men.

Second, Fishermen taking advantage of the rivalry began to run up the prices of eggs.

By the United States undertaking the entire work of egg gathering both these undesirable conditions were eliminated.

The practice thus started has worked so satisfactorily that it has been continued ever since. Whether it is the result of the understanding or an increased number of fish, or more skill, it is certain that under the arrangement now existing between the State and the United States has resulted in more eggs for both, and by the last of December more white fish eggs had been sent into the Hatchery at Erie than any year in its history.

In addition to the understanding the United States Government has materially assisted the Department in forwarding and expanding its work. Surplus lake trout eggs taken from Lake Superior are annually sent to Pennsylvania to be hatched and planted in Lake Erie. Rainbow trout eggs with which to establish breeding stock in the Hatcheries, and cut throat trout eggs for the same purpose and for experimental work have been freely sent whenever requests for them have been made by me.

On expressing a desire to the United States Commissioner of Fisheries, Mr. George M. Bowers, to experiment in fresh water pearl mussel he promptly came to the assistance of the Department by ordering three of the species sent to the Hatchery for breeding.

Counsel and help have been freely given whenever asked for.

New York gave 5,000,000 smelt eggs to the State in exchange for some thousands brook trout fry with which to stock their hatchery ponds for breeding purposes, and orders were issued to send a large quantity of muscalonge eggs to Corry to be hatched and planted in Conneaut Lake, but through a misunderstanding on the part of one of the New York subordinates the eggs were not received.

The states of New Jersey and Maryland and Minnesota have also evinced their friendliness in many ways.

With respect to Maryland the friendliness has so far advanced that overtures for joint propagation of white perch and shad for the mutual benefit of the Susquehanna and Delaware rivers are under way with a good prospect for a successful conclusion.

THE LEGISLATURE AND FISH LAWS.

With the opening of the legislative session of 1907, there came the usual flood of "fish bills." Most of them as usual, not being suitable, died in Committee or fell in the House or Senate. Along with them fell Senate Bill 88, which had been drafted by the Department. Senate Bill 88, introduced by Senator Roberts, of Montgomery, was drafted by the Department as a result of its four years' experience with the operation of the laws on the statute books, the decisions of the County and Superior Courts and after consultation with fishermen, both sportsmen and commercial.

I felt that the Act of May 29, 1901, was not as liberal as fish laws should be and I was desirous of giving as great freedom as possible, consistent with the maintenance of fish in the streams. The Act of May 29, 1901, was unsatisfactory in its first section in that it named certain fish as game fish and certain fish as food leaving a number not classed as either, although the Courts afterwards declared that all fish whether specifically declared to be game or food fish, were under the protection of the Acts on the statute books.

In the bill drafted by the Department, afterwards known as Senate Bill 88, certain fish were named as game fish, certain fish as minnows or bait fish and all other fish as food fish. The number of rods for the fish was placed at two and the number of handlines at two. The devices for catching food fish were increased in number and the seasons for their use lengthened materially. The bill met the approval of sportsmen throughout the state and the majority of the legitimate market fishermen. It passed the Senate without amendment. In the House some local interests were dissatisfied and they made radical changes in a large number of sections some

of which seemed clearly unconstitutional and others would have destroyed the fishery interests of the State. I made a strong appeal to the Committee on Fish and Game with the result that an agreement was entered into by which the legal defects were to be remedied and the other objectionable amendments were to be stricken out in Conference Committee. Unfortunately, this caused such a lengthy delay that the Legislature adjourned before the bill could be reached in the House on third reading.

A bill amending Section 2 of the Act of May 29, 1901, became a law, but as soon as it went into operation it was seen to be very unsatisfactory and apparently not covering what the framer intended. The new Act provides: First, that an unlimited number of tip-ups might be used for the catching of pickerel and yellow perch and limiting the catch to 20 pounds a day. The provision carrying the weight is unfortunate since it is liable to tempt the fisherman who has nearly the limit and then catches a fish which exceeds the limit, to break the law. A second provision, which is exceedingly unfortunate, provides that an unlimited number of rods and lines may be used for catching game fish.

Section 31 provides that fishing for fish not specifically described as game or food fish may be carried on at any time of the year with rod, hook and line or hand line, each having not more than three hooks. No mention is made in the amendment to Section 2 of Section 31, consequently it did not seem clear that a person might fish for catfish, carp, suckers, mullets, eels or yellow perch with more than a rod and a hand line at the same time, while clearly it set forth that a person might use an unlimited number of rods and lines for game fish. Neither is it clear whether the words "rods and lines" means to include "hand lines" along with "rods and lines."

A third, and to my mind, a very undesirable provision, made violations of that section misdemeanors, hence if a man were arrested for a violation of Section 2, the Justice of the Peace would have no authority to do anything else than to commit the man at the next session of the Court of Quarter Sessions to be tried by a jury even though the man might wish to pay his fine and not undergo the humiliation and disgrace of a jury trial. This provision, however, was promptly declared unconstitutional by the Lycoming County Court, not being mentioned in the title.

Another law which was enacted, which I consider very unfortunate, and which in the next two years I am afraid will sadly deplete the streams, permits gigging for carp, suckers, mullets and eels in the public waters of the state not inhabited by trout and in which trout have not been established or planted by the state from May 1, to October 31, provided the prongs be at least half an inch apart. Within two weeks after the bill had been signed by the Governor, blacksmith shop in every direction were busily engaged in making the new instrument for killing fish. One blacksmith informed the chief warden that he had enough orders on hand to occupy all the time that he could possibly spare from shoeing horses, in making gigs and the tinsmith said to the same officer that he had more orders on hand for lamps than he could make in six weeks.

It also became evident that a large percentage of people who secured gigs had no intention whatever of observing all the provisions of the law and before the first of June arrived the slaughter began. Under the loosely drawn wording of the Act, it is today impossible for the Department of Fisheries to enforce the provisions of the gigging law. There are not enough wardens or money enough appropriated even to begin to supervise the gigging. I believe that by the passage of this bill the fisheries of Pennsylvania, which had been much improved in the last four years, is in grave danger of being ruined and the Department is helpless to stop it.

CUMULATIVE FINES.

Many of the States when framing their Fish and Game Laws provided for cumulative fines for many offences and among those States is Pennsylvania. For example, under the act of May 29, 1901, it is unlawful to catch trout less than six inches in length or out of season and the penalty for such a violation is \$10 per fish.

The purpose of this cumulative fine provision is to make a violation rare or to prevent violation entirely by making possible exceedingly heavy fines.

So far of the Fish Laws are concerned it has always seemed to be injudicious to impose very heavy penalties however meritorious and necessary they may be in other Departments of the State Government, and experience has only confirmed this feeling, and I believe there should be a limit to the cumulative fine system for violation of the Fish Laws.

Since the creation of the Department there has been perhaps a dozen instances where fines against a single individual or two at the most have amounted to several hundred dollars, and, with one exception, the parties have been compelled to go to jail through their inability to pay the fine which was imposed. There was one instance in particular of a young man in McKean County less than twenty-one years old who was fined over \$300 for having in his possession over thirty under-sized trout. Without having previously advised this Department the warden pressed for and secured the maximum penalty, and the lad, for he was but little more, was sent to prison for over three hundred days. I endeavored to have the sentence mitigated, but I was advised that I had no power to alter or have the penalty reduced. It became necessary therefore to take the case before the Board of Pardons and the young man was pardoned.

There may be a few instances where a heavy maximum punishment would not be excessive, yet on general principles I believe that at the next session of the Legislature a law should be enacted limiting cumulative fines, say to \$100. I believe also that in other particulars penalties now provided by law for violations of the fish laws should be reduced.

THE SPORTSMAN SHOW.

In the month of March I received a letter from the officials of the Sportsman Show in Pittsburg asking for co-operation in making its proposed fisheries exhibit at their show, during the latter part of April and the beginning of May a success.

Believing that such exhibits were educational and of a decided benefit, I gladly agreed to give such co-operation as I could.

I furnished some male trout no longer of use to the hatchery. I also furnished plans for the building of a hatching battery and furnished some eggs with which to operate it; the young fish to be planted by the Department.

I detached one of the Superintendents for two weeks, the Sportsmen's Show agreeing to pay his salary for that time so that there should be no expense to the state. The Superintendent was William F. Haas, of the Spruce Creek Hatchery. A number of lake fish were secured and exhibited along with the trout in large tanks at the Show. The exhibiton was eminently successful and attracted extraordinary attention. Indeed it is declared to be one of the most attractive exhibits at the Sportsmen's Show illustrating the great interest which live fish always arouses and the desirability of cities establishing public aquaria similar to the one in New York City.

The Sportsman Show officials erected a Battery for hatching fish and equipped it with the necessary tanks and jars. I sent enough eggs of wall-eyed pike, pickerel and yellow perch to fill the ten jars of the Battery and one of the features of the Show was the hatching of the little fish from the eggs.

It was unfortunate that the size of the fish precluded their being observed as closely as visitors would have liked.

OFFICE WORK.

At the organization of the Department of Fisheries it was determined that no better work could be done than to get into close contact with the people of the state and have them thoroughly understand what the Department proposed to do, and how it desired the co-operation of every person interested in the restocking of the streams with fish. With this in view, correspondence was invited from every one and arrangements made to furnish in every case where asked for, if possible, information on the questions asked.

The personnel of the office at its organization was the Commissioner, one clerk and a stenographer. After the first few months it was gratifying to feel that the public appreciated the work of the Department and sought for information as well as fish. After that day by day the routine work of the office increased by leaps and bounds until the small office force was taxed to its utmost.

With the work of mere clerical work increased so much that it was necessary for the stenographer at times to assist the clerk. The last Legislature appreciated the situation and gave another stenographer which additional help has enabled the office to run much more smoothly and to keep down accumulated work.

The result of the efforts of the Department to spread information has been most beneficial and from everywheres come the reports that streams which were almost barren are now showing goodly returns to the fishermen. At first there was a disposition to grumble at the fish laws, but as people come to understand them they find that they are based upon experience and close observation, and their enforcement means more fish in the streams. No person writes to the office but obtains either the applications he asks for or the information if it is possible in any way to furnish the information.

As showing in a small way some of the office work some figures are given, but it must be remembered that these figures do not convey anywheres approximately the amount of the work, because many letters require several pages to answer the questions propounded and many times long decisions of the courts have to be copied and mailed.

During the year 9,745 letters and packages were sent by mail and 689 packages by express. In addition thousands of applications for fish were sent to the various applicants and of these the following were filed and entered for filling:

Brook trout,	3,888
Rainbow trout,	40
Frogs,	569
Lake trout,	28
Catfish,	174
Sunfish,	662
Wall-eyed pike,	64
Yellow perch,	864
Pickerel,	569
Gold fish for public school purposes,	90
Small mouth bass,	412

During the year there were issued under the provisions of the Act of April 26, 1905, 24 permits to take carp, suckers and mullets by means of seines. During the year one party of fishermen who had filed a bond and had a permit were convicted and fined and surrendered their permit. Under the provisions of the Act of May 29, 1901, 10 permits were issued for the removal of fish from one stream to another, and two for taking fish for scientific purposes. Three permits were issued for the use of dynamite for engineering purposes. One permit was issued for the taking of frogs for scientific purposes.

There were 158 special wardens appointed, of which three resigned, two were removed, one declined and two died. Under the provisions of the Act of May 29, 1907, 779 licenses were issued for fishbaskets, the revenue for the same at 75 cents each being \$584.25. One County Treasurer, at the writing of this report, has not re-

turned the issuance of any licenses, but it is understood that he has issued some licenses. Under the Act of 1903, permitting the use of eel baskets, three hundred and fifteen licenses were issued in 1906 at \$5.00 each and the receipts were \$1,575. The new law in regard to eel baskets has much increased the clerical work of the office from the fact that there were more licenses, while under the new law returns must be made to the State Treasurer every day involving quite as much each day as when they were made monthly.

In addition to this the law requires the holders of licenses to make affidavits that they took no game fish or suffered any to be taken in their baskets. These affidavits have to be entered and filed and in very many instances require correspondence to explain the law.

It is gratifying to feel, however, that the attention of the office force to the inquiries of the public has resulted in a much better feeling than was experienced when the office was first opened. Information in regard to planting of fish and the stocking of streams has been widely diffused and every citizen in the Commonwealth feels that if he writes here, if it is possible, the information he desires about fish will be promptly furnished him.

RECOMMENDATIONS.

Before closing my report I desire respectfully to recommend the following:

First, that the Department be authorized to increase the number of regular salaried wardens from twelve to twenty-five and that sufficient money be appropriated to pay them.

Second, owing to the increased work of the office that there be Legislation authorizing the appointment of a Chief Clerk.

Third, a large increase in the item for field work in order that this important branch of fish cultural work may be carried on on a proper scale.

The above is respectfully submitted.

W. E. MEEHAN,
Commissioner of Fisheries.

FINANCIAL STATEMENT.

The following is the statement of the Receipts and Expenditures of the Department of Fisheries for the year ending November 30, 1907.

Received from the State Treasurer for hatching and propagation and distribution of fish,	\$25,512.04		
Balance on hand November 30, 1906,	5,041.46		
		\$30,553.50	
Received from Lake Erie licenses for the year ending November 30, 1907,	\$755.00		
Balance on hand November 30, 1906,	404.61		
		1,159.64	
Received from the fines for the year ending November 30, 1907,	\$1,271.82		
Balance on hand November 30, 1906,	266.39		
		1,538.21	
Paid for hatcheries, propagation and distributing fish,		\$33,251.35	

WARDENS.

Received from the State Treasurer for the payment of wardens,	\$5,962.38		
Balance on hand November 30, 1906,	764.12		
		\$6,726.50	
Received from eel basket licenses during the year ending May 30, 1907,	\$25.00		
Balance on hand November 30, 1906,	41.38		
		66.38	
		\$6,792.88	

Paid for wardens during the year,		\$6,743.65	
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CONTINGENT FUND.

Received from the State Treasurer on account of contingent fund for the year ending November 30, 1907,	\$1,000.00		
Balance on hand November 30, 1906,	1.65		
		\$1,001.65	

Paid for incidental expenses,		\$948.10	
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NEW HATCHERIES.

Received from the State Treasurer for new hatcheries, act of May 11, 1905,	\$5,600.00		
Balance on hand November 30, 1906,	360.21		

Paid for new hatcheries and expenses,		\$5,360.21	
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TORRESDALE.

Balance on hand November 30, 1906, for repairs to the Torresdale hatchery, act of May 11, 1905,	\$25.12		
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Paid for labor, etc.,		\$25.12	
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ERIE AUXILIARY.

Balance on hand November 30, 1906, for fish hatchery auxiliary to the Erie hatchery, act of May 11, 1905,	\$3,688.94		
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Paid for salaries, labor, etc.,		\$3,688.94	
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EXPENSES OF COMMISSIONERS, ETC.			
Received from State Treasurer on account of traveling expenses of the Commissioner of Fisheries and the members of the Board of Fishery Commission,	\$558.27		

Paid for expenses,		\$558.27	
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COUNSEL FEES.

Received from the State Treasurer for the payment of counsel fees,	\$317.69		
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Paid for counsel fees,		\$317.69	
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FINANCIAL STATEMENT—Continued.

DEFICIENCY.			
Received from the State Treasurer for the payment of deficiencies,	\$1,000.00		
Paid for various items,	=====	\$407.15	
FIELD WORK.			
Received from the State Treasurer for field work, gathering spawn, etc.,	\$138.88		
Paid for expenses,	=====	\$138.88	
FOR COMPLETING HATCHERIES.			
Received from the State Treasurer for building ponds, and other work incidental towards completing hatcheries,	\$9,631.40		
Paid for labor and materials,	=====	\$9,631.40	
LAUNCH.			
Received from the State Treasurer for expenses in building launch for Lake Erie,	\$52.89		
Paid for expenses, advertising, etc.,	=====	\$52.89	

NOTE. Under the provisions of the act of May 25, 1907, all receipts for fines and licenses were turned in to the General Fund of the State Treasury, except such fines as were received for violation of the eel basket act of May 29, 1907. The amounts thus turned in were as follows:

Fines for violation of the fish law from June 1st to November 30th, 1907,	\$1,901.34		
Lake Erie licenses from June 1, 1907, to November 30, 1907,	915.00		
Received from licensees for eel baskets at 75 cents each,	500.25		
	\$3,406.59		

REPORTS OF HATCHERY STATIONS.

CARRY HATCHERY, STATION NO. 1.

Report of William Buller, Superintendent.

Hon. Wm. E. Meehan, Commissioner of Fisheries:

I have the honor to present the thirty-first annual report of the operations of this Hatchery.

I was much disappointed in the small number of trout eggs which were taken at this Station during the autumn and early winter of 1906. In all there was taken only 3,050,000. The eggs came much earlier than usual, the first being taken on the 26th of September and the last on December 29th. It was the smallest number of eggs taken at this Hatchery in many years. I was much disappointed because there was a decided increase in the number of the two year olds in the ponds, but fully 75 per cent. when the fish came to be sorted turned out to be males. As 3,000,000 eggs was not nearly enough to supply the demands for fish from this Station I received on your order 500,000 eggs from the Wayne Hatchery.

As the eggs were all very fine I had an unusually good hatch, bringing out about 3,500,000 fish. The fry were fine healthy fish and there seemed no reason why I should not be able to bring them all to distribution age, but one morning during the first week in February I noticed that the advanced fry from the eggs received from the Wayne Hatchery were showing marked distress. They were huddling thickly at the upper end of the troughs where the water flows in from the faucets. Their actions were exactly the same as those of fish which were not receiving a sufficient supply of water. This, however, very soon proved not to be the case. The next morning the other fish in the remainder of the troughs also began to show distress, and a close examination showed that the fry was suffering from a form of sore throat. It was different from any form that I had ever seen before.

Red sore throat is common among lake trout advanced fry, at least at this hatchery, and it has occasionally appeared among the brook trout, but that which had now broken out among the fish was of a brownish yellow. Every trough occupied in all the hatching houses had affected fish. The disease was of such a character that it prevented the secretion of slime. Specimens of the advanced fry showed none on the body. Nets run through the trough produced none and the meshes remained perfectly clean and free from it. I salted vigorously and used many different kinds. I first began with fine salt and afterwards tried rock salt. At times I used this remedy as often as twice a day. Little apparent good resulted.

I, of course, notified you of condition of affairs and recommended that the fish be distributed immediately, believing that if they could be put into the streams those which were affected would re-

cover. I received orders to ship. I sent the first lot out about the 10th of February, and by the first week in May had the last lot delivered to applicants. All the applications were filled with the exception of two which could not be reached. As soon as I had my troughs fairly well thinned the disease began to disappear, but whether it was from the thinning or salting or water conditions that improved I cannot say.

Owing to our work and the prompt distribution we did not lose more than a million and a half. For a while I expected the entire stock to die. The disease might have been caused from one of two sources, and perhaps from both. It might first have occurred from an overplus of snow-water getting into the spring, and second it might have been through a super-abundance of sediment.

Owing to the increased demands for fish by the people it has become necessary to carry greater quantities of fry in troughs than we did under the Fish Commission's reign. It is not only necessary but proper from a fish culturist's standpoint though the fish require more work and attention to prevent trouble than with light troughs. Just before the appearance of the disease there had been a very heavy snow storm followed by a sudden thaw, and from the character of the soil of the hatchery much of this snow-water found its way into the spring, thus appreciably reducing the supply of oxygen. For several years the spring which supplies No. 1 House has not given its normal supply of water and I have been forced to augment it from other sources, and this source carried with it some sediment, and at the time of the trouble there was an unusually large quantity. Either or both I think was sufficient to produce the disease.

I saved about 70,000 young fish for stock, but whether it was from the effects of the sore throat or an overplus of algae which appeared unusually early in my fry ponds, or whether it was from the dilapidated and rotten boards of the sides of the ponds, I do not know, but it is certain that I had the heaviest loss among my fingerlings that I have ever had since I was superintendent of this Station. From 70,000 I did not succeed in rearing more than 8,000, the number in the ponds on the first of December.

About the middle of January I received 1,000,000 eyed lake trout eggs from the United States Fish Hatchery at Northville. They arrived in splendid shape and soon hatched, the loss being practically nothing. They were all planted in Lake Erie in April with the exception of a few thousand which were shipped to applicants for interior lakes. In the beginning of March there was received 40,000 rainbow trout eggs from the United States Hatchery in Manchester, Ohio. These eggs were eyed, but did not arrive in as good condition as the lake trout eggs from Northville. I hatched about 80 per cent. and all were from the eggs by the 14th and were retained for breeding purposes in this hatchery and some to be sent to the Spruce Creek hatchery.

Frogs beginning to spawn early in April, I gathered 150 quarts, distributing them in two ponds. In one the eggs failed to hatch, due, I believe, to having been injured by frost. The other eggs hatched rapidly and I soon had a fine stock of tadpoles. On the 27th of June before there was any sign of their hind legs breaking

they began to get sick. Although I had no reason to believe the pond to be overcrowded I removed about one-half and put them in another pond. A couple of hours after this had been done the tadpoles began to look better, but a few hours later they began to die, and by the 30th they were all dead. They appeared to be uneasy in their movements, would gather up in bunches and drop to the bottom of the pond where they would lie a while then raise to the surface again where they would struggle apparently much distressed and afterwards drop again to the bottom, reminding one in their movements of the larva of the mosquito working from the bottom to the surface for air and back again. This erratic movement they kept up until death came. Some of the tadpoles had a red spot at different parts on their bellies and others were red about the vent. Others again had apparently no mark to indicate anything wrong.

There was not a living thing in the pond except the tadpoles. I looked carefully for the larvae of the water beetle, also for the daphne. It was therefore none of the numerous enemies; of that I am convinced, neither was it a weakness from overcrowding, for they were not overrowded. It was not from the sapping of their vitality through the act of breaking out their legs, because that period had not arrived. That they were diseased was evident, and I think the same disease that attended the tadpoles at Erie three years ago. I believe I have discovered the cause.

Owing to the fact that tad-pole culture presents so many difficult problems I made it a rule to attend to the stock myself and not to have any of the men do it. I gave them the food even with my own hands. The food which I gave them was beef liver ground very fine. On the afternoon of the 26th I went into Corry for some supplies for the hatchery and during the afternoon one of the men entirely on his own initiative fed the tad-poles. Not being careful in the first place he failed to use beef liver and used hog liver instead, and in addition had used the coarse blade for grinding it. Hog liver is very greasy. The next day, the 27th, was the day on which the trouble occurred. A close examination revealed chunks of decayed hog liver, and there was a distinct greasy appearance on the surface of the water. On being questioned the men on the place all denied having fed the tad-poles, apparently being afraid at the outcome. Later, after the discharge of one of the men for some offense it came out that it was he who had fed them.

I had something of the same thing happen with some trout in the summer of 1906. The trout were No. 1 fingerling, and were in some of the troughs of the hatching houses. I had ground some liver paste for these fish, but before finishing was called away and I left the pan standing outside of the hatching house where the sun fell upon it. A couple of hours later recalling that the fish had not been fed I told one of the men to grind some food and feed them. Passing the pan of paste on his way to the meat house, and not knowing any better, he mixed it with water and fed the fish. The sun had tainted the liver and within twenty-four hours nearly everyone of the trout in the troughs which had been fed with this liver were dead. In both the case of the trout in the troughs and the tad-poles in the ponds there was a minimum flow

of water not sufficient to carry off the tainted meat, hence the trouble.

Early in June I received 200 blue-gilled sunfish and 50 bull heads from Erie. These I placed in a couple of ponds for breeding purposes. The sunfish went to work immediately building nests and hatched out a fine lot of young fish, but subsequently lost them with the exception of 1,000 by holding them too long in the troughs before shipping. The bull-heads produced quite a stock and I shipped 1,700 in October of the number threes. In November I shipped 3,000 yearling Lake trout for the breeding ponds at the Spruce Creek hatchery.

The water on the Corry hatchery is not well adapted to rearing sunfish or bull-heads or catfish on a large scale. It will do very well for a few fish simply to help out at nearby points not easily reached by Union City, Erie, Conneaut Lake or Torresdale.

Trout eggs this year began on October 6th, about ten days later than last year, but when they did begin to come they came with a rush and by December 1st I had 4,000,000 eggs in my troughs and there are at least half a million more to take. I am still bothered with a surplus of young males. For the last three years by far the largest percentage of fish retained have been of this sex. The percentage, I am glad to say, was not as heavy as last year, but is still much heavier than it should be, or I would like. Quite a number of my two year olds also were too small to strip, otherwise I should have taken this year at least 5,000,000 eggs.

Three years ago I made a cross between the brook trout and the brown trout and reared between two and three hundred very beautiful fish, almost identical in appearance. At the age of two years one or two of the females produced eggs, but there were no males ripe, and the eggs appeared very late in the season. I therefore concluded that the hybrid partook more of the nature of the true trout and would not come to spawn bearing age until three years. Up to the 1st of December not a single fish has shown any signs of ripening. It is possible that they may spawn later in the season. I hope so. It is evident to me that this hybrid, even though it proves to be fertile, will not meet your desires for a fish for waters which have become too warm for brook trout, but would yet hold fish of the character of the brown trout. My reason is that the hybrid appears to be nearly, if not quite, as rapid a grower as the brown trout, while I understand that you wish a fish that grows only about the size of the ordinary brook trout. In accordance with your instructions, if the fish spawns later and I can secure any male brook trout, I will make another crossing between the hybrid and the male brook. It may sound like an absurdity, but all the leisure time on this hatchery during the year and when regular work was not in progress was spent in digging ditches, repairing walks, grubbing stumps and work of that character.

Immediately after the 1st of June when the new appropriation became available you visited this hatchery and planned a thorough overhauling and repairing of the plant. It had fallen into a woeful state of dilapidation. The hatchery is nearly thirty-three years old and many of the ponds constructed the first year have never had sides reboarded. In fact none of them have ever been repaired ex-

cept temporarily, with the exception of the show pond and two trout ponds which were done since the creation of the Department. The show pond and one of the trout ponds were reconstructed with tile sides and one trout pond with boards. As a matter of course, the boards which formed the sides of the old ponds rotted long ago, the ground outside being mucky worked through the openings of the boards and left nothing but dilapidated, unsightly and unsuitable ponds for the retention of trout. It was not possible to carry more than two-thirds their normal capacity. Disease became frequent and for the last four or five years it has not been possible for me to bring to spawning age anything like 50 per cent. of the original stock retained.

The barn which was originally a mill built nearly a hundred years ago had fallen into decay and for the last three years has had to be propped up with beams to keep it from falling down. One-half the troughs in the No. 1 House had become so rotten that one could force a finger through and they were only held together anyways watertight by the asphaltum paint. You made comprehensive plans for the regeneration of the property, the greater part to be completed within the next two years.

Two carloads of building tile and one-half carload of cement were purchased, and with these I set my men to work at reconstructing all the ponds in the front of the property. Some of them badly designed in the beginning I re-outlined and others enlarged. Wherever it was possible I used concrete for the sides, it being much cheaper and quite as pretty as tile. In two or three instances where there was not a good foundation I used tile. By the time egg-taking arrived I had the entire set of ponds in the front of the place remodeled and rebuilt with plenty of concrete and tile left to begin work on the ponds on the lower part of the property next spring.

I tore out all the troughs in the No. 1 house, keeping those which were still good and there were sufficient of these for one tier. I had troughs made to replace those thrown away as rotten, and in setting them did so according to your plan carried out at Union City, only that there are but two tiers instead of three, the house not being wide enough except for the two. I am much pleased with the new arrangement. First there is greater convenience in working, and second, it requires just one-half the water formerly required to operate the same number of troughs. This last is a pretty good feature as it will permit me to abandon a source of water supply which contained much sediment and use the old spring which originally supplied the hatching house before it was enlarged. The fence in front of the property had been rotten for several years and kept up only with great difficulty. This fence I tore away under your orders and in its place have put a neat wire fence. One of the neatest and most substantial I have ever seen and one which has excited admiration from everyone who has seen it.

I also built a new drive-way from the main road down to No. 3 hatching house and stoned it, and next summer I hope to surface and roll it.

I finished grading the ground around the dwelling house and sodded and sowed the place with grass seed. I also made concrete walks around the house.

The No. 1 Hatching House is a structure about two-thirds of which was built before the property was acquired by the State. As it is a frame structure it naturally deteriorated. When the Department took the property over from the Fish Commission it was about ready to fall down. The roof was repaired in parts where necessary. On account of the muggy character of the soil the foundation walls were not perfectly solid and during the summer I re-enforced them with a concrete wall two feet deep and one foot wide. This acts as a shore and will hold the walls up for an indefinite period.

I tore down the old barn and built a new structure 46 x 34 feet. The old rafters and studding were nearly all perfectly sound, some of the former being hand-hewn. These I used in the construction of the new building. By hiring country carpenters by the day and using our own men I was enabled to erect this barn at a cost of only about \$700. The structure is in the old site and is a basement with barn above. The bank foundation wall and floor is of concrete and the basement walls are sheathed. I have running water inside and the building is large enough for all our wants.

For the first time in many years I had some trouble with my employes. Two of the men began showing a lack of interest in their work and a tendency to do as they pleased, and without saying so gave the impression that they had influence enough to retain them in their positions without earning their salary. I bore with them for a while in the hopes that they would come to their senses, but mistaking this attitude they began to absent themselves without leave. The first time I reprimanded them; the second time I got rid of them. Since then I have had no trouble. The new men who replaced the two malcontents have joined with the older men in working cheerfully and showing interest in their duties.

I had the misfortune to lose one of my horses early in the year. According to the veterinary surgeon the cause of death was liver trouble. I bought a new and perfectly sound horse for \$125, an animal for which we have since received offers for more than double the money.

Accompanying this report will be found my record of distribution of fish from December 1, 1906, to December 1, 1907.

Beforegoing is respectfully submitted,

WILLIAM BULLER,
Superintendent.

CORRY HATCHERY, STATION NO. 1.

Fish, etc., distributed from December 1, 1906, to November 30, 1907.

BROOK TROUT. FINGERLINGS NO. 1.

Allegheny county,	3,900
Armstrong county,	35,000
Butler county,	7,400
Crawford county,	53,500

	Off. Doc.
Cameron county,	119,200
Cambria county,	117,800
Clinton county,	204,900
Clearfield county,	14,600
Clarion county,	54,500
Erie county,	107,300
Elk county,	198,700
Forest county,	103,600
Fayette county,	107,700
Jefferson county,	109,400
Lycoming county,	152,600
Lawrence county,	12,500
Mercer county,	11,000
McKean county,	165,200
Potter county,	298,000
Somerset county,	36,700
Tioga county,	258,400
Venango county,	175,900
Westmoreland county,	128,500
Warren county,	297,300
Total,	2,773,600

Brook Trout, Advanced Fry.

Carbon county,	225,000
Total,	225,000

Brook Trout, Four Year Old Males.

Crawford county,	300
Erie county,	350
Venango county,	100
Total,	750

Lake Trout, Fingerlings No. 1.

Planted in Lake Erie,	950,000
Total,	950,000

Lake Trout, Yearling.

Huntingdon county,	3,000
Total,	3,000

Loch Leven Trout, Fingerlings No. 1.

Philadelphia county,	40,000
Total,	40,000

Yellow Perch, Adults.

Erie county,	75
Total,	75

Yellow Perch, Fingerlings No. 2.

Erie county,	1,375
Total,	1,375

Sunfish, Fingerlings No. 2.

Elk county,	500
Warren county,	500
Total,	1,000

Catfish, Yearlings.

Clinton county,	100
Crawford county,	125
Erie county,	200
Indiana county,	100
Jefferson county,	350
Lawrence county,	25
Mercer county,	100
Total,	990

Catfish, Fingerlings No. 3.

Elk county,	100
Erie county,	1,400
Crawford county,	600
Total,	2,100

Tad-Poles.

Elk county,	7,500
Total,	7,500

Summary.

Brook Trout,	2,999,350
Lake Trout,	953,000
Loch Leven Trout,	40,000
Yellow Perch,	1,450
Sunfish, Fingerlings No. 2,	1,000
Catfish,	3,090
Tad-poles,	7,500
Total,	4,005,390

REPORT OF THE

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Estimated Number of Breeding Fish in the Ponds at the Hatchery.	
Brook Trout, four years old and over,	8,950
Brook Trout, three years old,	8,000
Brook Trout, two years old,	9,000
Brook Trout, one year old,	10,000
Lake Trout, three years old,	700
Lake Trout, one year old,	2,000
Rainbow Trout, two years old,	2,500
Rainbow Trout, one year old,	2,500
Sunfish, blue gill and long ears,	400
Catfish,	400
Bull-heads,	50
 Total,	 44,550

DEPARTMENT OF FISHERIES.

ERIE HATCHERY, STATION NO. 2.

Report of Philip H. Hartman, Assistant Superintendent.

Hon W. E. Meehan, Commissioner of Fisheries:

Dear Sir: I submit to you my second annual report, from December 1st, 1906, to November 30th, 1907, and I can say that the year just past has left this station with the largest output it has ever had. The total output of adult fish, frogs and fry was 234,164,846.

After filling the hatchery last fall with white fish and herring eggs, I had a surplus of 7,740,000 white fish, which I shipped to Torresdale hatchery. After being hatched the fry were returned and planted in Lake Erie. They all came through in good condition considering the long journey, and I must say the cans were all well filled.

The white fish and herring at this station, started to show the eye December 7th, started to hatch March 11th, and on March 26th, I made the last plant. The ice had not left the harbor, and the lake was still full when we started to plant, but I was fortunate enough to secure the steel tug Racket, Captain William Tallman, owner, which broke her way out, so that we could plant. Probably not another tug could have done the work at that time.

Owing to the closed season here last fall, we were not able to secure as many lake herring eggs as I should have liked to have. Therefore, our output of herring for the year fell below the average. The tug, Silver Spray, which was fishing in Ohio waters, under a United States permit, got to fishing close to Erie and ran in here with the fish caught, at the same time leaving the herring eggs which had been taken at the hatchery, in all 3,120,000 eggs, which, with the herring eggs secured at Port Clinton, helped us out considerably.

On April 4th, I started to gather frog spawn. I secured 567,000 eggs. 70,000 were shipped to Union City hatchery, 140,000 to Crawford hatchery, 140,000 to Bellefonte hatchery and 7,000 to Superintendent Haas, who had charge of the fishing exhibit at the Sportsman's show, which was held in Pittsburgh in April, 210,000 I put in ponds at this hatchery.

The spawn I had here was all hatched in fifteen days, the tadpoles were feeding fine and growing rapidly, until June 6th, when they suddenly began to die in pond No. 1. In two days, every tadpole in this pond was dead. The tadpoles in pond No. 2 were not affected until June 25th, when they began to die, but not nearly as fast as in No. 1, owing to the size and strength they had attained from the time that had elapsed from June 3rd to June 25th. As I had applications on hand to fill at that time, I filled them, and put 20,000 in ponds on the Peninsula before losing them all.

In making a study of the fatalities which are most always sure to happen in frog culture, I discovered that daphnia, which belongs to the crab family, plays a prominent part in the destruction of tadpoles. They cling to the tadpoles in large numbers, and in a short time the tadpoles are raw and sore, and soon dead. The ponds in which I had the tadpoles are literally alive with daphnia this year. If there can be found a way of getting rid of daphnia in frog ponds, without harming the tadpoles, I am sure it will go a great way to help frog culture in the future.

The first wall-eyed pike eggs arrived April 12th and the last May 6th. May 4th they began to show the eye, started to hatch on May 15th, and were all out on May 19th. The take of wall-eyed pike eggs was the largest ever had. Acting under orders from the Commissioner, I filled this hatchery and shipped 3,500,000 eggs to the Sportsman's show at Pittsburgh, 21,000,000 to Torresdale hatchery, and 14,000,000 to the Wayne hatchery. One third of the fry hatched at Erie were planted in inland waters, and two-thirds in Lake Erie.

On April 26th I received 128,000 yellow perch eggs from Union City hatchery. May 3rd I received 3,840,000 perch eggs from Torresdale, May 5th, I received 78,320,000 yellow perch eggs and 20,000,000 chain pickerel eggs from Wayne hatchery. All were eyed eggs, and started to hatch with the last twenty-four hours of the hatching of the wall-eyed pike. More than one-half of the chain pickerel were shipped to inland waters, and the rest were planted in Presque Isle Bay at Erie.

Of the yellow perch fry, Lake Erie got a good heavy stocking and did not furnish an egg, all the eggs coming from inland waters. Some of the applicants for yellow perch were sorely disappointed in not receiving their fish after being notified that they would be shipped, although no fault of ours. It came about through unforeseen water conditions arising near the close of the hatching. The eggs hatched rapidly, and forced us to plant in the lake oftener than I should have liked to. At that time, I had about 5,000,000 fry in the retaining tanks to fill the few remaining applications, but on May 20th an employee of the City Water Department started to draw off the hydrants, as is customary every spring, to cleanse the pipes. He got in the neighborhood of the hatchery.

Just as soon as I saw the color of the water coming through the jars, I knew where the trouble was coming from. I hunted the man up, and asked him to wait a day or two before drawing any more, as in that time the fish would all be out. He did so, but it was too late. The damage had been done. The water was as thick as mud, and had a vile odor to it. After a time the water cleared up, but left an inch of mud in the bottom of the tanks. I saw the fry were rapidly dying. I did the best thing that could be done; took them out and planted them in the lake after losing about 2,000,000 of what I had retained.

There were no blue pike eggs taken here last spring, although the catches of these fish were large. In the first place there was not a man to be had who could take eggs. The men were all fishing on shares and making good money, more than we could have paid them, and when the fish did begin to spawn the catches became so light that the boats pulled out their twine and laid up.

On June 3rd I started to draw the seine for adult fish to stock the hatcheries for use as breeders, namely, large mouth bass, calico bass, rock bass, yellow perch, blue gills and bull-heads. In eleven days we caught 2,000 fish. In handling them the loss was very small, owing to the low temperature of the water, and the cold weather prevailing at that time, it all being in our favor for that special work. Not getting the amount of yellow perch wanted, with the seine, I undertook to get them this fall with hook and line, at which I was very successful, getting 3,039 in this way, all being quite large.

June 9th we set trap nets in Lake Erie, for the capture of adult small mouth bass. We fished the nets for weeks. In this time we caught 223 as fine bass as ever were caught for any hatchery. The fish all ran in weight from one and one-half to four pounds each, and as near in pairs as any one could wish to have them.

Superintendent A. G. Buller, of the Union City hatchery, on July 6th sent me 50,000 bass fingerlings, which he had raised from the breeders he had received, and which I planted in Erie Bay.

At the time we were catching fish for the hatcheries, there was quite an uproar made by some people who did not understand what we were doing. It was noised about that the Department of Fisheries was depopulating the Bay of its game fishes, especially its small mouth bass to stock other waters, which was not true, as all the fishes caught were sent to Pennsylvania hatcheries to be used as breeders. Whoever it was who started the excitement did not know the difference between a small mouth bass or large mouth bass, or did not want to know. The small mouth bass I caught in trap nets set in Lake Erie, five miles down the lake and that many miles from Erie. So it is plain to see that in place of taking small mouth bass out of the bay, we were putting them in instead. I also planted blue gills and calico bass fingerlings in Erie Bay, which came from Union City hatchery.

I gave a collection of fish eggs and newly hatched fry to Mr. Thomas L. Austin, Curator of the Erie Public Library. Also made a collection of fingerlings, game fish, food fish and minnows for Professor H. W. Fowler of the Academy of Natural Science of Philadelphia. This was done in connection with our regular work. With special attention I could have made larger collections, which I would have liked to do very much. As it was, I found two specimens which had not before been known to exist in Pennsylvania waters, and I am almost positive that a few more specimens not known of Pennsylvania waters are to be found here. I made a shipment to Professor Fowler on November 3rd, and they were received by him at the Academy of Natural Sciences of Philadelphia on the fourth. A few days later I received a letter from him under date of November 5th, in which he said that the species received numbered fourteen and were as follows:

Prinephales-notatus.
Brama-erysoleucas-auratus.
Notrapus-Whipplei.
N. Hudsonius.
N. atherenoides.

Noturus-flavus.
Fundulus-menoma.
Labidesthes-rupestris.
Euphemotis Gibbosus.
Misropterus-dolanien.
M. salmoides.
Perea-flavescens.
Ammosrypta-perllucida.

The last named, according to Professor Fowler is the only representative of this family in this region, and the species of the fundulas sent him, was the first of this species that has ever been seen in Pennsylvania.

Captain Driscoll, who had the contract to remove the carp from Erie Bay in 1906, had the contract again this year. There were hardly enough carp caught to pay for his license, only 49,705 pounds being caught throughout the season. The weather being bad and the water not getting warm enough, the carp did not work inshore, which is most natural for carp to do in summer.

The white fish season this year had been most remarkable, it being one of the best ever known. It was conceded by many fishermen a few years back, that this great fish was about extinct, and soon would be no more, and nothing could be done to restore. Today one and all agree that it is due to the Department of Fisheries, whose Commissioner, Mr. W. E. Meehan, has seen to it that millions upon millions of these fish were hatched and planted each year, and all are loud in their praise of the good work done by the Department of Fisheries, and insist that the Erie hatchery be enlarged to increase its capacity. It might be well to say there was a tendency on the part of some of the fishermen to show a bitterness towards the Department, owing to the enforcement of the law relating to the closed season last fall. But since the repeal of that law, and finding out that the Department was not opposed to the repeal of it, indeed had helped to secure the repeal, the best of feelings exists today, and all are ready and willing to help the good work along.

One old battery at this station was torn down and replaced with a new one, and its capacity increased from 240 jars to 250. The floor overhead, upon which rests the large tank, which supplies the batteries, had become unsafe to work under. I had an oak post and braces put underneath it, until something more substantial can be done.

Acting under instructions from the Commissioner, I had a new three-inch wrought iron put in, which gave us two separate water lines to draw from. This was a very important piece of work done, and all through the foresight of the Commissioner, who saw the straits we would be in, should anything happen our water supply with no other to draw from.

The first eggs for this fall work began to arrive November 12th to December 1st. The number of eggs taken was 96,780,000, which were distributed as follows. Before the season ends I hope to take enough eggs here to fill both Erie and Crawford hatcheries to their full capacity.

We had two thousand visitors who registered and as many more who did not care to register. Each year the people are becoming more interested in fish culture work, more so the students in our schools here at Erie. On several occasions I have been asked for turtles, frogs or fish for the Erie High School, and I would recommend that some provision be made whereby I could furnish them with what they asked for, within reasonable bounds as we all know that fish culture is becoming one of the most important studies in our schools today.

I collected \$1,605.00 license fees the past year, which is an increase of \$141.00 over last year.

Summary of License Monies Collected Year 1907.

March,	\$70 00
April,	600 00
May,	285 00
June,	55 00
July,	40 00
August,	90 00
September,	225 00
November,	70 00
December,	20 00
June, permit to catch carp to Jerry Driscoll,	100 00
July, permit to catch carp to Jerry Driscoll, 15 days.	50 00
 Total,	 \$1,605 00

A matter of very great interest to the Department has come to my attention, which I think ought to be brought before you, officially by me. There is a movement on foot to induce the State to take all or nearly all of which is known as the Peninsula for the purpose of a great State Park and turn over the several ponds or lakes therein with the exception of Cranberry pond, which is now used by the city of Erie for water purposes, to the Department of Fisheries, as huge breeding ponds for fish for Lake Erie. I heard indirectly that a bill was drafted for presentation at the last session of the Legislature, but for some reason not given me the bill was held for the present.

The question, however, of making a great park and turning the ponds over to the Department of Fisheries and asking a State appropriation for dredging the connecting channels and otherwise putting them in proper shape was publicly discussed at the annual banquet of the Erie Yacht Club on October 11th. The Speaker, Water Commissioner William Hamilton, one of the best known and most public spirited citizens of Erie held that these great ponds on the Peninsula should be utilized by the State through its Department of Fisheries as breeding ponds and retaining places for fish hatched at the State hatcheries at and near Erie. He declared his belief that this should be done for a three fold purpose; first, that certain types of fishes like black bass which are difficult of propagation, could, with proper supervision of the Department of Fish-

eries be bred there in large quantities; second, that newly hatched white fish, lake herring and similar fishes usually planted as soon as hatched could be planted and retained there until able to take care of themselves before being liberated in the Lake; and third, that these fish, small and large, would act as mosquito destroyers by devouring the larvae.

The matter has been discussed favorable by many people. Paach Brothers, who own a sand dredge have publicly stated that they will allow the State the free use of it to clear out the channels. I deem it my duty to draw your attention officially to this matter, because, knowing most of the men who are concerned in this movement, that it will come before the Legislature in the near future, and that you will be asked for your co-operation and support. Familiar as I am with the Peninsula, I can say positively that this is in fact a very big movement, and of tremendous importance to the Department of Fisheries. It is one that, if it is carried out and adopted by the State, will make the Department of Fisheries one of the largest in the State Government. It will need a force of one hundred men to care for the waters which would come under its control. There are more than two dozen lakes or ponds on the Peninsula, of the two largest, Long pond is about two miles in length, Big pond is about one and one half miles, and in fact all are quite large bodies of water. I herewith most heartily thank the Commissioner, Mr. Meehan and all connected with the Department of Fisheries for their hearty support accorded me the past year.

Respectfully submitted,
PHILIP H. HARTMAN, Supt.

ERIE HATCHERY, STATION NO. 2.

Fish, etc., distributed from December 1, 1906, to November 30, 1907.

White Fish.

Planted in Lake Erie, fry,	33,345,000
Planted in Lake Erie, fingerlings,	1,500
Total,	33,346,500

Lake Herring.

Planted in Lake Erie, fry,	7,000,000
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Pickerel Fry.

Allegheny county,	180,000
Crawford county,	2,200,000
Centre county,	500,000
Erie county,	1,500,000
Elk county,	400,000
Jefferson county,	1,100,000
Mercer county,	100,000
Warren county,	3,900,000
Planted in Lake Erie,	8,200,000
Total,	18,000,000

Yellow Perch.

Allegheny county, fry,	200,000
Armstrong county,	1,300,000
Crawford county,	1,100,000
Clarion county,	600,000
Elk county,	1,000,000
Erie county,	2,100,000
Jefferson county,	700,000
Mercer county,	400,000
Warren county,	3,200,000
Planted in Lake Erie,	68,500,000
Total,	79,100,000

Erie county, adults,	1,466
Crawford county,	1,573
Total,	79,103,039

Rock Bass.

Erie county, adults,	209
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Bull-heads or Catfish.

Erie county, adults,	93
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Black Bass.

Erie county, adults,	259
Crawford county, adults,	118
Huntingdon county, adults,	56
Total,	433

Calico Bass.

Erie county, adults,	283
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Blue Gill Sunfish.

Erie county, adults,	644
Crawford county, adults,	245
Total,	<u>889</u>

Tad-poles.

Erie county,	6,400
Planted on Peninsula,	20,000
Total,	<u>26,400</u>

Wall-eyed Pike Fry.

Armstrong county,	700,000
Bedford county,	1,600,000
Bradford county,	600,000
Clinton county,	4,000,000
Crawford county,	3,300,000
Clarion county,	600,000
Erie county,	600,000
Lycoming county,	4,000,000
Montour county,	600,000
Snyder county,	3,000,000
Union county,	1,600,000
Venango county,	4,500,000
Warren county,	7,400,000
Planted in Lake Erie,	64,187,000
Total,	<u>96,687,000</u>

Summary.

White Fish fry,	33,345,000
White Fish, fingerlings,	1,500
Lake Herring, fry,	7,000,000
Pickerel, fry,	18,000,000
Wall-eyed Pike, fry,	96,687,000
Yellow Perch, fry,	79,100,000
Yellow Perch, adults,	3,039
Rock Bass, adults,	209
Bull-heads, adults,	93
Black Bass, Adults,	433
Calico Bass, adults,	283
Blue-Gill Sunfish, adults,	889
Tad-poles,	26,400
Total,	<u>234,164,846</u>

BELLEFONTE HATCHERY, STATION NO. 3.

Report of Superintendent Howard M. Buller and Assistant Superintendent, B. O. Webster.

Hon. W. E. Meehan, Commissioner of Fisheries:

Sir: Herewith is submitted our yearly report of the operations and work of the Bellefonte Station, from December 1st, 1906, to November 30, 1907.

This has been a year well filled with activity and a long step has been made toward bringing the station into prominence with reference to trout propagation among the trout raising stations in this great Commonwealth, and other states, as well as bringing it into pronounced favor for its beauty and adaptability for which it was located.

The success that has followed our efforts in carrying the large quantity of young fish that were held over last year for breeding purposes has been remarkable. The thirteen cement ponds that were built in 1905 have proven to be most excellent ponds for the work we have been using them for. Our yearling fish sorted into them last year grew well, with so small a loss that it is not worth mentioning. We have on hand a large number of breeding fish.

With only the ponds that were on the grounds at the close of last year to depend upon, it would have necessitated the crowding of our fish to the danger degree.

According to your wise judgment the pond capacity has been largely increased with many other valuable improvements of which we will speak more fully later on in this report.

It is becoming more noticeable each year that you call upon the force at this station for help when men of reliance and experience are needed to take charge of any extra or unlooked for fish culture work. A fact of which we are proud. Thus the frequent reference in this report to our men being sent away.

On December 1st there were 511,200 brook trout eggs received from Weissport station, making a grand total of 3,146,400 brook trout eggs for this station.

At this time one of our men, Mr. D. W. Houser, was detailed at Weissport, assisting in the gathering of spawn and it was he who delivered the eggs which came through in good condition.

During the months of December and January the whole time was occupied in caring for the fish and eggs. On account of the very early beginning of the spawning at this station, we were able to start feeding the oldest fry on the 25th of December, and as soon as possible after they began to feed, the nursery ponds outside were filled. To be exact, the time we filled the first nursery pond was on January 29th, 1907. Reversing our usual custom of holding back a certain number of troughs of fish for breeders, we filled the nursery

ponds by thinning out troughs throughout the house, the troughs being still well filled after a sufficient number to supply our eleven nursery ponds had been taken out.

Our rainbow trout began spawning much earlier this year than last and it is our opinion that as the fish grow older they spawn earlier. This has been our experience here at least. They commenced hatching on January 2d and the last spawn was taken on the 22d of the same month.

Considerable trouble and quite a large loss of fry was sustained by a disease called "sore throat." The fry would manifest the sickness by turning on their sides, so that the bright color around the eye-ball was plainly visible, there to lie hardly moving for days. When brushed with a feather they would do nothing more than wiggle the tail a little, apparently too weak to care whether they were disturbed or not. On close examination it was found that the gill rakers were swollen and inflamed. It might properly have been called Tuberculosis of the Gills.

All kinds of remedies we could think of were resorted to without results. The trouble would not yield in the least to any kind of salt treatment.

In accordance with an agreement with the Pohoqualine Fish Association, 50,000 advanced fry were delivered to them on January 23d, in return for which 100,000 wild brook trout eggs were shipped here on January 25th. These eggs all hatched but the fry came out at about the time the epidemic struck this place and as a consequence we did not save as many as we would, had not this thing occurred. However, there is a nice pond of them that will go far in introducing new blood into our present stock when they come to the spawning period.

As the troughs in the house became filled with brook trout fry it became necessary to use the troughs outside for some of the brook trout as well as all of the rainbow trout fry when they hatched.

As there had not been any provision more than a temporary one made for shading them, lumber was ordered cut into strips the pieces long enough to cover one half of the trough, when made into frames. By so doing they were much lighter and easier to handle than they would have been if they had reached the full length of the trough. The frames were covered, first, with a small mesh poultry wire. For the upper part of the trough we used building paper on top of the poultry wire and then a covering of burlaps and for the lower end of the trough only wire and burlaps thus giving plenty of shade and all the light necessary. In building light shades for outside work the wire has to be used in order that heavy snow storms will not break them through. Their frames are an altered form of those designed by the Superintendent of the Wayne hatchery.

It was deemed advisable to commence shipping the fingerlings by the last of February and in accordance with orders the first shipment was sent out on February 28th. Just as fast as possible after this fish were shipped from here to the various counties as per the report of shipment affixed to this report, the last shipment being made of April 30th.

It was thought advisable to once more try the problem of raising frogs at this station, so frog pond No. 1 was made ready for eggs and on April 9th forty quarts of eggs were received from Erie. Only a small quantity were tried this year in the hope that a few placed in the pond would do better than a great many as had been tried before. The result was about the same, all hatched and the tadpoles commenced to feed as before, but before the tails were absorbed and the hind legs came, the tadpoles died.

The total mortality was largely due this year to the extremely cold water as the weather at times after they were put into the pond was down to the freezing point.

The months of April and May being very full as the young fish and shipping required the constant attention of all regular employees, Hr. Hazel was hired by the month and one other man temporarily to assist in starting the much needed work that was waiting outside the house.

As early as possible we commenced putting the top dressing on the road leading to the hatching house, using for this purpose fine sifted lime stone from a quarry near here and succeeded in getting the road covered from the highway to the upper end of the hatchery house, making a fine road and a very good appearance. A walk from this road to the hatchery door was also completed.

This being a damp place we dug a ditch and laid forty feet of six inch tile underneath the walk to carry off the water, making a good dry lime stone path all the way from the highway to the hatching house. The concrete wall at the head of the nursery troughs outside was extended across the space between the troughs and the house and along the front until it met the large concrete wall in which the spring water pipe passes into the house, thus preventing this end of the house from rotting as it would had we filled in with dirt and stone enough to bring the walk level with the rest of the walks and wall.

The ground between the road leading to the back of the hatchery and the supply trough for the troughs outside, was leveled off and now presents a much better appearance. A walk leading from the hatchery to the house along the wall of the two large ponds in front of the house was commenced and about one hundred feet of it was completed.

On April 15th orders were received to get the car ready to go to Pittsburg and in accordance with those orders the tanks were soaked up in the creek and the whole car overhauled, being swept and washed inside and out. On April 18th all arrangements being completed the start was made. Yourself being in charge, with Superintendent William Haas and an assistant of the Spruce Creek Hatchery as crew, taking with you 175,000 four year old brook trout to Allegheny county. The car returned on April 29th.

The field work having opened at Wayne county about this time, orders were received from you on April 25th to send D. W. Houser there on that work. Mr. Houser was immediately sent to Wayne county and remained there until July 2d, making a stay of about ten weeks.

At this time we were waiting to hear from you before sending Mr. Harry Griffeth to Torresdale to be detailed from there to assist in

the Delaware River shad work under the direction of Superintendent Berkhous of the Torresdale Hatchery. Mr. Griffeth returned to this station for duty on June 10th.

Continuing the grading and improvement work on the grounds our attention was next attracted to the need of a change in the yard surrounding the barn. It was in the shape of a small side hill and overgrown with weeds and filled with stone making it unsightly and causing great quantities of water to run into the barn yard whenever there was a storm, with no place to drain off. It was necessary therefore to somewhat level it off, which was done. Filling all the lowest places with the surplus ground from above and with the addition of a new wire fence across the north end and several loads of sifted lime stone on the road leading to the back of the barn and the barn yard. It greatly improved the appearance of the whole place.

A gutter was made outside of the fence leading down the hill toward the creek for the purpose of carrying off the surface water.

On the inside of the fence which surrounds this yard we planted about one dozen cherry trees. Having more of those trees than were needed there the remainder were planted along the race back of Assistant Superintendent's cottage. The barn having a dirt floor and being located over a small spring was generally very wet during the latter part of the winter and spring time. In fact, it was so wet that it was necessary to remove the stock to the barn making it quite inconvenient. In order to make the place inhabitable we dug out about four inches of earth where the entire stable space and having a drainage caused the ditch to be dug along the north side of the thirteen ponds leading from the barn to the creek. We then laid about seventy feet of four inch tile through the stable and across the barn yard connecting it with the waste water pipe from the watering trough. This done we commenced laying a concrete floor over the whole stable. First a heavy coat of slag, lime stone and cement, which covered on the top with a coat of sand and cement, made a complete, durable and altogether satisfactory job.

During the spring after vegetation has gotten nicely started it is always necessary to clean out the race from the dam above the hatchery to the reservoir where the water flows into the ponds below. The race has become so filled with mud and dirt washed into it by heavy rains that it is about half filled up and as water cress is abundant in all spring waters around here it soon forms so heavy a growth in our race that the flow of water is materially checked. Considerable time is consumed each year keeping this clean and in our recommendations at the end of this report we have explained how this can be overcome and materially benefit the water supply.

As soon as possible after the shipping was finished and the ponds were cleaned and made ready for the yearling fish, which were to be sorted from the thirteen rearing ponds into the larger ones, the work of sorting them was commenced and a very gratifying job it proved to be, as the fish were all that could be asked for. Not only clean and healthy but most of them of fair size and showing every sign of producing eggs in the coming fall.

This work moved on very slowly owing to the small force of men we had at the start, as was mentioned before, Houser at Wayne county hatchery and Griffeth on the shad work left only the two of us. The fish were sorted into three sizes and placed in the large ponds back of the hatchery, about five thousand being placed in each pond. It was found impossible to get them all out of the upper ponds as the large pond room was rapidly filling up, so out of the thirteen ponds six were left and a valuable lesson was learned therefrom. It was found in the fall when the fish were taken out that they were in as fine condition as those taken out in the spring so far as health was concerned, thus proving the adaptability of those ponds for rearing fingerlings or holding older fish for any length of time.

As soon as the fish were sorted from the seven ponds, they were drawn off and the sides scraped and the bottom cleaned, taking care at this time to see that every yearling was taken out before any small fish were put into them again. When this was completed we commenced filling them up with fingerlings, rainbow and brook trout from the troughs in the house. Not having sufficient room in those ponds for all the young fish we wished to keep for breeders, upon a suggestion from you we utilized the frog pond for brook trout. We had them cleaned and by means of two one and a half inch iron pipes about twenty feet long connected to the two nipples which enter the spring through the concrete wall built around it, we were able to get plenty of fresh spring water into frog ponds Nos. 1 and 2 and placed about 1,500 fish in each. They did very well while they were small but as they began to get larger and the fall weather came on it was evident that something must be done at once as they did not eat well. They were among the first to be transferred to the ponds above.

Right here we might speak about the experience we had with the few brown trout that were hatched last winter. As it was desirous to try and raise some of this species here, it was thought best to keep them apart from the brook trout, and do all possible to raise them, there being so few (only the eggs from one fish) it was not a success.

Our mistake was in trying to rear them alone, for had we put them out with the brook trout in the fall we feel sure the results would have been better. This plan we intend carrying out in the future when only a small number of any particular kind of fish are obtainable. The few, only five small slim fellows, were left, when we filled the frog pond near Dale run with the brook trout, and these we put with them. When that pond was sorted, but one remained. It was well and strong, however, and will produce eggs or milt for us next fall.

After the sorting and transferring to ponds where the fish will remain until spawning time again, we find that we have:

Three and four year old brook trout,	1,000
Two year old brook trout,	30,000
Yearling brook trout,	45,641
Four year old rainbow trout,	500
Two year old rainbow trout,	1,000

Yearling rainbow trout,	10,000
Adult Japanese gold fish,	300
Fingerling gold fish,	300
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Making a total of fish of all kinds on hand to-day,	88,741

It was absolutely to do some painting this year and upon receiving orders from you we obtained several bids from reliable contractors here for doing this work and submitted them to you. That of Mr. John Noll being the most reasonable, it was accepted. We will state here that the work he did was very satisfactory.

The cottage used by the assistant had never been painted and was rapidly showing the results of storm and weather, but after three coats of white paint for the body and the same number of green for the trimming it presents a very pleasing appearance. The fence in front of the superintendent's cottage was also greatly improved by one coat of paint for the body and trimming.

The contract called for two coats for the meat house which made that look very presentable. It would be a wonderful addition to the appearance of the whole station if all pond shades and buildings were painted the same color.

The First Assistant Superintendent's cottage was also badly in need of eave troughs, as the house had never been equipped with them, the drip from the eaves had gradually worked its way through the earth into the cellar and whenever a heavy storm burst, the water entered in such quantities that it was unusual, as there is nothing but a dirt floor.

Having orders to do what was necessary we had troughs and conductor pipe put on, making a complete job of it.

We had one pond which has never been completed further than the excavation and concrete ends, having dirt sides and the natural clay bottom. In this pond there is a very heavy growth of Chara moss which is the natural water plant for the growth of many aquatic insects that are necessary to the cultivation and life of bass fry. From time to time we have shipped this in cans to various bass stations in the state where it has been planted in both large ponds for adults and small nursery ponds for rearing the bass fry after they rise from their nests and commence to feed.

This method of starting aquatic plants in new ponds has proven most successful as it has given a luxuriant growth in one season. Had it not been possible to transplant it in this way it would have probably been some time before many of the new bass ponds built in this state would have had sufficient growth to have provided feed for any great number of the young. Although great quantities have been shipped, there is plenty left and when we receive an order for eight cans to be shipped to Union City Station, we had no trouble in getting it.

As the stock of fish at this station has rapidly increased in the last year and a half, the fact that more ponds must be constructed was imperative. Previous to this time, however, we had in mind the construction of new ponds along the lines of the thirteen built in 1905, which have been mentioned before in this report with so much praise. With the land space to build them and the excellent

water supply so handy to feed them, it was not a hard matter to come to a definite conclusion in a conference with you while upon your visit to this station in June, as to what should be built and how they should be constructed.

Knowing the urgency of having as many ponds as could possibly be constructed in the short time left for the work, as well as being somewhat limited in the amount of money available, it was finally decided to build ten new ponds in two groups of four and six respectively. These ponds to have the sewerage system installed with a race at the head for the purpose of receiving fresh water, and one at the foot for the purpose of carrying off the waste and so supplied with slash boards or dam boards as to enable the transfer of the water to other ponds or allow it to flow into the creek as circumstances required. Further, having in mind all the time the probability that other new ponds will be so constructed that the waste water from these ponds can be used if needed.

Another convenience to be considered, was the installing of the sewerage system which will enable us to clean these new ponds without allowing all the dirt and refuse from those above to run into those immediately below. This will be more fully touched upon a little later.

In building the new ponds the level of the first thirteen has been maintained which made it necessary to raise the walls of four ponds which were built on the ground level, in the south east corner of the hatchery property.

This of course was foreseen when the estimates were gotten out so that virtually there were fourteen instead of ten ponds built this summer.

The new ponds were connected with the main race and all have the same conveniences as to water supply, drainage, &c.

After all arrangements had been completed it was necessary to make our measurements and lay out the ponds in sizes that would be best adapted for use at this particular place. It was found possible to build four ponds parallel with the north end of the foot race belonging to the thirteen ponds already built. By allowing the head of these four ponds to extend thirty-five feet north from the above mentioned race it was possible to make them 11 by 35 feet with a nine foot walk between the ponds and race on one side, and a V shaped piece of ground on the other next to the four ponds to be capped. The four ponds are 14x35 feet. The land below would allow for six ponds, 13x38 feet with a ten foot walk between the second and third row, also a ten foot walk between the first row and the foot race of the thirteen ponds above them, together with the necessary race walls, making a grand total of 3,870 cubic feet of wall to be built.

The fact that the ground where the new ponds were to be built was of a swampy nature, made it the more difficult to figure on the amount of material needed, as it was impossible to tell how low we would have to go for a solid foundation on which to build the walls.

After going over the ground with you and taking every detail carefully into consideration it was decided to buy a car load of cement, containing 150 barrels, also a car load of slag from a neigh-

boring furnace, two car loads of sand and about two car loads of fine sifted lime stone from a nearby quarry. All this material was immediately ordered.

It was thought best at first to hire extra teams for hauling the slag and lime stone, which was done, but after a good supply was gotten on hand it was found that by hard work on the part of one of our men and the horse we have, it was possible to keep stock enough on hand. When the car of cement came it was immediately unloaded and placed in the large barn. This was accomplished on July 12th and but a few days elapsed before our sand was shipped in.

The shipping of sand to this station is compulsory. The obtaining of stone is a simple matter with us but sand we have not.

Previous to the arrival of the material the staking out of the first group of four ponds had been finished, so that as soon as possible thereafter the work of construction was commenced.

It was first thought necessary to tap the reservoir to get the supply for these ponds but after duly considering the matter, taking into consideration the cost and the time it would require to run a ditch to the reservoir which is about 200 feet away, we conceived the idea that we could tap the large twenty-four inch inflow pipe which carries all the water from the reservoir to the thirteen ponds. We at once made plans accordingly. This would necessitate the laying of about forty feet of eight inch tile and the excavation of a ditch only one foot deep. To get the water from the large tile, we had constructed a cement reservoir three feet square and on a level with the race into which the water flows, then by simply cutting a hole in the twenty-four inch tile and running the eight inch tile at right angles with the main pipe, entering it at the head race of the four ponds the water supply question was easily settled.

When we came to make the excavations for the new ponds we met with the soggy, wet ground proposition, but by going down as low as sixteen inches in some places we found that a hard clay bottom was obtainable. The ground being low, only the trenches for the walls were dug, in fact all the ponds built this summer were made in this way.

The bottom being thrown out after the walls were made and the dirt used to fill in and level outside.

Work was naturally slow on account of the wet condition of the ground. As soon as sufficient trenches were dug to allow the starting of the walls, the setting of forms for the race at the head of the ponds was commenced. As there were forms ready made in sections about three feet wide, they were used, but owing to the depth we were obliged to go for a foundation it was found that they were about one and a half feet too narrow but by adding boards to the bottom of them they could be used. Not having enough of these ready made forms to set up, one of the ponds we were obliged to use the stock of pine lumber we had on hand in making cribbing, which was a much slower method than by using the forms but it was the only thing to do.

This lumber we had on hand to use in making shades for the ponds, it being in lengths from eight to fourteen feet and one inch thick. Care was taken in using this lumber to preserve regular

lengths so that it can be used when we are through with it on this job, for the original purpose for which it was intended. Had the lumber been thicker, as one and one-half inch lumber is required for ready made forms, we could have saved much time by making it up.

The group of four new ponds was completed as soon as possible and when the walls were dry enough to stand the strain caused by the dirt being filled around them on the outside, the bottoms were dug out and most of it placed on the east side between the ponds and the race of the thirteen. After it was leveled off and seeded down it made a very nice appearance.

The capping of the four ponds which were built in 1904 was next started and although it was a hard matter to build new concrete work on top of old in pond construction, without having dangerous leaks occur when they are filled with water, the success which followed our efforts was very gratifying. Before putting up the forms for these walls the top edges were battered off on both sides making a very rough surface to which the concrete became cemented in as solid a mass as if all has been built new. When the top dressing of sand and cement was plastered on, the ponds became as water tight as new walls.

With the addition of the three foot cap, these ponds are the deepest we have on the grounds. Originally, the depth was three and one-half feet, which makes it possible to carry about six feet of water in them and by means of the eight inch tile which was put into the head race from the head race of the four new ponds makes it possible with the six inch inflow pipe which originally supplied these ponds, and draws water directly from the reservoir to get a large flow of water which will enable us to carry almost any number of large fish in them without danger of loss.

When the thirteen cement ponds adjoining the new ponds were built an eight inch crook was placed in the race to carry off all extra water that was not needed to supply the ponds above and below the hatching, but during high water which occurs in the fall and spring it was found to be altogether inadequate, causing the race to fill almost to overflowing which made high water in the ponds around the house. It was decided therefore to replace this eight inch tile with one twelve inches so connected with the race of the four new ponds and the overflows of the four capped ponds that a complete sewerage system for the thirteen ponds above as well as the four new and four capped ponds could be had. In order to do this it was necessary to dig a deep ditch from the run outside of the hatchery grounds to the foot race of the thirteen cement ponds, going just low enough to enable us to lay our twelve inch terra-cotta pipe so that it would not interfere with the bottom of the race we had to build over it. By using three T lengths of terra-cotta, it was possible to connect the race from the four new ponds and each of the overflows from the ponds that had been capped. These overflows are connected with the head race for the group of six new ponds. The length of this twelve inch sewer pipe is about seventy-five feet.

By means of dam boards, either two of the four capped ponds can be drawn off without interfering with the water supply of any of the others. Also by the same arrangement the four new ponds can be handled in the same way.

By means of a ten inch terra-cotta pipe placed in the west end of the head race of the six ponds the water can be drawn out of this race when ever it is necessary. This sewer pipe is ten feet long making eighty-five feet of sewer pipe used in constructing these ponds. Another feature that should be mentioned in this introduction of fresh water into the head race for the six new ponds. A four inch terra-cotta pipe had been laid from the head race of the four ponds that were capped to a small spring below. It was necessary to take up this pipe when the larger sewer pipe was laid and by putting on an elbow it was possible to bring it into the race just above the twelve inch sewer pipe. This will be a valuable addition of fresh water for the group of six ponds.

The head race running along the six ponds varies in depth from three and one-half to nearly five feet, giving an excellent way to carry off all dirt and refuse that may be run into it when the ponds are drained. The east wall of the ponds was carried through on a level of the foot race of the thirteen ponds above, making it a little higher than the other walls of the ponds but it had to be done in order to make a level earth space of nine feet between them and the race where there are several fine trees growing. The walls of these ponds are much taller than the other new structures, owing to the depth I had to go down for a foundation. The spring I referred to above rises in the lower pond of the first row and around this spring on either side the ground was a black bog with clay underneath at a depth varying from twelve to twenty-four inches.

The work of construction the last group of six ponds was begun immediately upon the completion of the head race. The walls for the sides of all these ponds were made eight inches thick, with the cross wall in the center and lower ends twelve and ten inches respectively. The wall which makes a lengthwise partition between ponds one and two, and three and four, was made only six inches thick. We would not recommend the building of any more six inch walls in pond construction. What is saved in material is lost in the extra time it takes to set up the forms for such a narrow wall and the strength is not in them.

In order to give the necessary fall for the proper aeration of the water all the walls from the head were dropped six inches. The walls of the lower tier of ponds were also dropped six inches lower than the center cross wall making a foot wall from the head race or water supply. The first four were built side by side, a ten foot space was then left for a ground plot and the next two were built on the outside of this ground plot. This had to be done in order to leave a space to handle our fish when taking them out or putting them into the ponds. Also, it makes a fine place for planting trees as has been done with the other ponds that have been built. The addition of the spring water which comes from the small spring that rises in pond No. 2 of this group will be valuable to these ponds as well as to the ponds below that will be fed from this group. Plans already partly formulated for the building of another group

of ponds below those here described made it necessary to raise the level of the foot race walls in order to have the outside wall high enough to be of any benefit when the next group is started; accordingly, they were raised six inches, making them on a level with the center cross wall of this group. In building the foot race for the six ponds a twelve inch sewer pipe was installed with splash board arrangements to raise the water if need be and an eight inch terra-cotta pipe, leading from the north end of the race, to supply three ponds below, the first of which is 150 feet north from place of starting. These ponds had previously been supplied with water from the small spring heretofore mentioned which gave them a very inadequate amount of water. The three were connected with a four inch terra-cotta pipe, which was taken out and replaced with an eight inch, making a great addition to the value of all three, as any quantity of water desired can be gotten into them now. The walls of this last group being completed, the work of throwing out the dirt and making bottoms was at once commenced. The dirt which came from them was used to grade around the outside walls. As there will not be any near enough to properly establish the grade around them, it will be necessary to haul ground to them from the lower end of the property, east of the hatching house, where it is the intention to build a large pond.

Immediately after the ponds were all completed we had constructed four shades for the first two rows of ponds, which used all the available timber for making the rafters. This was about October 12th. At this time the Board of Fish Commissioners held their regular quarterly meeting at this station and after carefully inspecting the work that had been done during the year, expressed to us their pleasure and satisfaction on what had been accomplished. During the business session of the meeting it was decided, on the recommendation of Commissioner Meehan, to abolish the position of first assistant at this station and promote Mr. B. O. Webster, who was holding that position, to that of Assistant Superintendent. In making the change the Board expressed its belief that the promotion of Mr. Webster was deserved, and that better results could be accomplished in the future.

On account of being obliged to use every available man regularly employed at this station on the construction of the new ponds it was necessary to leave much undone in preparation for the fall and winter work until the very last moment. Therefore, just as soon as possible, arrangements were made to get the house ready for the reception of eggs, which came at this station about ten days later than last year. On the 16th of October we took our first brook trout eggs, obtaining them from the three and four year old fish. Our first day's take was about 60,000 eggs.

Naturally all the time during the next month was taken up in gathering spawn from the stock of fish in our ponds. It was at first estimated that we would be able to gather 2,500,000 brook trout eggs, but when the fish were gone over it was found that the estimate was a little too large. The result of our work gave us 2,300,000 as fine brook trout eggs as was ever put into a hatching house and no doubt the hatch from these eggs will be very satisfactory. In sorting our fish, it appeared that they were running

about three males to one female, as is the usual average, but to our surprise, when the sorting was all done and the count figured up, it was found that they had run about two females to three males or one and one-half to one, which will not give us the large surplus of males we had expected all along. It was found upon sorting the fish previous to taking the eggs from them that many of them were very small, in fact, about 5,000 of the stock, mostly females it is supposed, would not spawn this fall. These fish were carefully separated from the spawners and put into ponds by themselves, where a marked growth has already been noticed. We can depend upon getting eggs from everyone of them next fall.

Every precaution was taken in handling the fish to avoid any mortality among them and before they were placed in the ponds after taking the eggs, where they will remain throughout the year, they were given a salt bath. This is an excellent idea and should be always done after taking the eggs from any kind of trout. Just in the midst of the busiest part of the egg taking season, orders were received from you to send Mr. Harry Griffeth to the Spruce Creek station to take charge of the work there on account of the illness of Superintendent William Haas, who was confined to his bed. Mr. Griffeth was absent on this duty from October 22d until November 23d, when he returned to this station for duty. Immediately upon his return we received word to send him to Penn Forrest, where Superintendent Berkhous was in charge gathering brook trout eggs for Wayne county and Spruce Creek hatcheries. In looking over the various dates that our men have been absent from this station on field work or other hatchery work this year, we find that the combined time for one man would be five months and nine days. All the egg shipping cases from this station were sent to the field this fall, part were shipped to Port Allegheny, where Superintendent A. G. Buller was gathering spawn for the Spruce Creek station and the remainder were sent to Penn Forrest.

It was hoped that the rainbow trout at this station would not be ready to spawn this year before all the brook trout eggs were gathered, but as usual signs of spawning were evident by the middle of November, and on the 20th of that month the first eggs were taken they looked fine, as all rainbow trout eggs do when first taken. By the time the eye spots showed a great many ringers were noticed as is always the case. The Assistant Superintendent, immediately upon discovering this, hit upon a plan whereby many more of this species of eggs may possibly be fertilized, than is possible by taking the eggs as has been done in the past. Instead of taking the eggs from several fish in one pan and mixing them with the milt, only the eggs from one female and the milt from one male was put into the pan and thoroughly mixed. This pan was then set aside and with another pan the operation was repeated, pouring the fertilized eggs from each fish into pan number one until enough to fill the pan were obtained. We are watching this experiment with a good deal of interest but as the eggs are not old enough for the eye spots to show we cannot give the results here. Our two year old rainbow trout have been examined from time to time to determine whether any eggs can be obtained from them this year or not, but as yet the females show no signs, while once in a while we find a fine male as

ripe as can be with plenty of milt. This is only found among the largest of them, however, showing that the rapid growth of the fish develops his generative organs much faster than when the growth is not so rapid. We have found this same thing occurring among large males of the brook trout. Our brown trout usually spawn about the same time that the brook trout, but this year it was not until late in November that we could get any eggs from them. When the pond where they are kept was seined only one female could be found from which eggs could be obtained. As the stock of brown trout is small and most of what we have are males, it was no trouble to fertilize what we got and as all the brown trout eggs that were taken became fertilized the hatch will be almost 100 per cent., which will enable us to make a fair start with this species next year.

Our Atlantic salmon, (*Salmo Salar*) were in the same pond with the brown trout and from appearances last year, we were sure it would be possible to gather a goodly number of eggs of this splendid game fish, but to my dismay, when all the salmon were taken out of the pond only one would produce eggs, and as it was found upon examination, the remainder, five in number, were all females, but would not spawn until this year. As plenty brown trout males were at hand the salmon eggs were crossed with the brown trout. The experiment, however, was not a success. There were about 200 salmon eggs taken and just two of them became fertilized and reached the eye age, but they died before they were old enough to hatch.

It is unfortunate that all these fish are females and that it is not possible to cross them with the brown trout. However, this year's experiment with them can hardly be called a fair test as there were so very few for us to make the experiment with. They will probably all spawn next fall which will give us an opportunity to try the cross with the brook trout male as well as with the rainbow trout. If it were possible to cross these salmon with the brook trout, we think a very fine food fish as well as game fish could be obtained.

The work of improvement at this station this year has been of great benefit from a fish culturist's standpoint. The total number of ponds has been increased by ten and the installing of the eight inch terra-cotta pipe into the three ponds west of the hatchery has made them as good as new ponds, so we can almost say the addition has been thirteen instead of ten, making a total of fifty-nine ponds in all, with plenty of fish to fill them.

RECOMMENDATIONS.

The improvement to be made on the race leading from the dam to the reservoir which supplies the ponds with water and which has been heretofore mentioned, is one of the important matters to be considered in our next year's work. In order to put it into the best condition possible, it would have to be widened about three feet, which could easily be done, and a concrete wall built in the center of it from the dam to the reservoir, making a double race, as it were so arranged that the water could be run into one side or the other as necessity required. By such an arrangement, it would be

possible to shut the water off one side while the other was being cleaned, giving us the usual flow of water all the time. As more ponds are being added, which depend upon this race for water supply, it is very necessary that such an arrangement should be made to prevent the possible shutting off of the water for the purpose of cleaning. The ground lying north between the last group of six new ponds and the large spring which supplies the hatching house, is especially adapted for the continuation of the construction of another group of cement ponds, this space is 134x133 feet, making it possible to build a group of twenty-one ponds, similar to those just completed, averaging fourteen by thirty-five feet. The large increase in the stock of brook trout at this station in the coming year makes it necessary that at least this group should be built to accommodate them.

East of the hatching house there is a vacant space 250x375 feet, which should be used in building a large pond for holding our stock fish. A pond of this kind is badly needed at this station, as it would greatly increase the stock fish during the spawning season. A pond of this kind should have a small run or shallow pondlike inlet, where the spawning fish could enter when they are ready to deposit their eggs, to be arranged so that it could be screened off from the large pond, thus enabling the fish to follow their natural instinct during the season, also enabling us to gather their eggs without handling them more than once. The overflow from this pond would solve the question for supplying water to run the wheel used for cutting the fish food, the present supply being altogether inadequate.

The building of a new ice-house is also very necessary, as the one now in use is beyond repairs. The need of a good supply of ice to be used in shipping fish and keeping the fish food during the summer months is very important. With the present house this is very hard to accomplish. The barn is in great need of a coat of paint and as it has never been painted, it shows in greater contrast since the painting done last summer. As another horse is to be sent to this station next spring, it is necessary that a two horse wagon should be bought, also a light spring wagon is badly needed. There are several badly needed repairs on the cottage used by the Assistant Superintendent. The cellar wall on the west side of the house only extends twelve feet from the southwest corner, the remainder being loosely boarded up, making the cellar useless, and that part of the house very cold. A stone or concrete wall should be built to replace the board siding. The cellar also needs a lime or cement floor. The roof on the Superintendent's cottage is in great need of a new covering as the shingles that are now on it are old and rotten. In conclusion an improvement is recommended for the water supply for both Superintendent and Assistant Superintendent's cottage. With the flow of water at this station, it would be a very easy and inexpensive matter to install a hydraulic ram at the overflow of the race.

Respectively submitted,

H. M. BULLER, Sup't.

B. O. WEBSTER, Ass't Sup't,

BELLEFONTE HATCHERY, STATION NO. 3.

Fish, etc., distributed from December 1, 1906, to November 30, 1907.

Brook Trout, Fingerlings No. 1.

Adams county,	4,500
Bradford county,	1,500
Bucks county,	7,500
Blair county,	286,500
Berks county,	133,500
Centre county,	403,500
Cumberland county,	103,500
Chester county,	39,000
Clearfield county,	342,000
Clinton county,	36,000
Dauphin county,	15,000
Delaware county,	9,000
Franklin county,	48,000
Huntingdon county,	34,500
Indiana county,	12,000
Juniata county,	7,500
Lancaster county,	21,000
Lebanon county,	57,000
Montgomery county,	66,000
Mifflin county,	70,500
Northumberland county,	112,500
Northampton county,	7,500
Philadelphia county,	18,000
Perry county,	22,500
Schuylkill county,	127,500
Snyder county,	7,500
Union county,	42,000
York county,	121,500
Total,	2,327,000

Brook Trout, Advanced Fry.

Carbon county,	300,000
Monroe county,	50,000
Total,	350,000

Brook Trout, Fingerling No. 2 and Yearlings.

Cambria county,	4,000
Clearfield county,	16,500
Centre county,	5,000

Montgomery county,	600
Philadelphia county,	50
Total,	26,150

Brook Trout, Old Males.

Allegheny county,	175
Centre county,	1,234
Dauphin county,	75
Snyder county,	25
Total,	1,509

Gold Fish.

Dauphin county,	6

Acquatic Plants.

Erie county,	400

Rainbow Trout, No. 1 Fingerlings.

Blair county,	4,500
Berks county,	3,000
Carbon county,	3,000
Clarion county,	4,500
Chester county,	10,500
Clearfield county,	57,000
Lehigh county,	6,000
Lebanon county,	36,000
Lycoming county,	112,500
Lancaster county,	3,000
McKean county,	6,000
Monroe county,	3,000
Schuylkill county,	6,000
Tioga county,	15,000
Total,	270,000

Summary.

Brook Trout, fry, fingerlings and yearlings,	2,703,150
Brook Trout, old males,	1,509
Goldfish,	6
Aquatic Plants,	400
Rainbow Trout,	270,000
Total,	2,975,065

WAYNE COUNTY FISH HATCHERY, STATION NO. 4.

Report of Nathan R. Buller, Superintendent.

To Hon. W. E. Meehan:

I again have the pleasure of submitting to you my annual report of operations at the Wayne Fish Hatchery for the year commencing December 1, 1906, and ending December 1, 1907.

My first subject to report will be brook trout, as we were busily engaged in that work at the end of last year.

Through the courtesy of Col. H. C. Trexler permission was given to collect all the surplus brook trout eggs on his Cetronia Trout Preserve, the stock consisting of about 20,000 adult trout. The arrangement of this property is of such a character that the environments are practically the same as the trout find in their wild and natural homes. Under these conditions the results of my work after shipping the green eggs from Cetronia to the Wayne Hatchery, the loss until the hatching period was only five per cent., and I attribute part of this loss to the killing of the germ in their transit, which is always the case in shipping green eggs, and a portion of the germ will be injured or destroyed. I consider the impregnation was almost perfect. The number of eggs gathered and forwarded to Wayne from Cetronia were 2,000,000.

The same courtesy was also extended to the Department by Charles Wolters, owner of the Weisport Brook Trout Hatchery. This plant is conducted upon a purely commercial basis. The object is to feed and grow the trout by artificial means to as large a size as is possible with care and food until they reach the age of two years, when they are forwarded to the different markets.

I have found in my work of handling the fish in commercial hatcheries that the greater portion of them at the age of twenty months attain the size of one-half to three-quarter pounds. In order to have fish this size at that age they are necessarily kept very fat and results are that it is difficult to fertilize as large a percentage of the eggs as is the case of trout having greater freedom. Of the 4,000,000 of eggs taken and shipped from this hatchery my loss was thirty per cent. Of the 1,255,000 eggs shipped to Bellefonte the loss was about the same.

In the work of gathering eggs from these different stations I was assisted by Merton J. Taylor and J. Cecil Glanville. We proceeded to Allentown on November 5th and returned on December the 20th. There was still a few eggs to be taken at the Weisport hatchery, but as the weather had become very cold and a great deal of ice collected on the ponds I was afraid of injuring the fish by handling them through the ice. After returning home I was advised to proceed to Blooming Grove Park at Glen Eyre, Pike county, to assist Wm. Haas, superintendent of the Spruce Creek hatchery to collect what eggs were left at this plant. We succeeded in collecting

300,000. I have also taken the surplus eggs from the plant this season. This is the third attempt, and I would advise that in the future unless we are able to go there at the beginning of the season I would not bother, as the first season the results of the hatch were not over fifteen per cent. Mr. Haas reported to me the same results last season. This season I am satisfied that our percentage will not exceed ten per cent. Now for the cause: At the time we are allowed to handle the fish is the extreme end of the spawning period, and as the fish are not handled previous to that period we find almost every fish with their eggs partly spawned. The part that we get it is impossible to fertilize. I think that this could be avoided by making arrangements for one of the attendants to spend the season there.

In addition to the 1,255,000 green eggs shipped to the Bellefonte hatchery I shipped 500,000 eyed eggs to Spruce Creek, 500,000 brook trout eyed eggs to Corry and 50,000 trout eyed eggs to Carbon county. The balance of the eggs taken that season were hatched at the Wayne hatchery, filling up to its fullest capacity our three tiers or troughs. The fry that were hatched were all very strong and healthy, but unfortunately during the month of March on account of the extreme cold weather our supply of water had dwindled to thirty-six gallons per minute. On account of the small flow in passing through three sets of troughs the flow was not sufficient to cause circulation enough in the lower tier. Results were that I lost about 300,000 fry before I could remedy the matter. Barring this our plant of brook trout was very successful, there being no trouble or disease of any kind. The scarcity of water was with the spring. Under present regulations it is impossible for me to use a supply of water from the creek. I brought this matter to your attention before. It would probably be in place for me to mention it here. There should be by all means a six inch pipe line from the head of the hatchery grounds to the Brook Trout hatchery to prevent any accident of a similar nature in the future. Our present line is on top of the grounds and can only be used during the spring and summer. This line should be buried deep enough to insure it from freezing. The same line should be used for the battery.

On November 1, 1907, by your directions, I proceeded to Weissport to assist in the collection of brook trout eggs. I assisted Mr. Wertz, the superintendent at the hatchery, until all the eggs were taken, which were in numbers 9,800,000. Owing to the great number and demand for them our share was 300,000, which were shipped to the Wayne hatchery. Per your advice I proceeded from Weissport to Blooming Grove Park, Glen Eyre, Pike county, Pennsylvania, to collect what eggs were left over there. Results were 269,000. Received from Penn Forest Brook Trout Company 926,000 eggs. Eggs taken from fish at Wayne hatchery, 300,000.

PICKEREL WORK.

Taking into consideration the efforts made to keep the lakes in north eastern Pennsylvania fully stocked and also the infusion of new blood I commenced to prepare for the work April 1st, making my first visit to Long Pond. After spending a whole day looking

carefully over the ground I found that I was early. The fish had shown no signs of spawning their eggs. Nevertheless I kept up visiting the different ponds from time to time during the month of April.

D. W. Houser by your instructions arrived to assist in the work on the 24th day of April, and from that time I kept D. W. Houser, G. W. Buller and M. L. O'Hara on the lakes every day, and as the season was getting late I was afraid that we would miss them. The weather conditions being very cold, the fish were very late in depositing their eggs. The first fish to spawn was the Wild Wood Pond, on the second day of May. The second lake to spawn was at Long Pond. A few days after fish began to spawn simultaneously in all the lakes and I can assure you from that time on the whole force was kept very busy throughout the month as I was very anxious to gather, hatch and distribute all the fry I possibly could, and I would suggest that during the coming season you allow me to have for work a larger force of men. There were so many lakes to cover that it was almost impossible with the small force of men at my command to do the amount of work I would like to see accomplished, and the output depends entirely on the number of men you have to gather the eggs and distribute the fry. By having three or four crew of men they could work to better advantage, and oftentimes there are too many days elapse between the visits to each lake and a great many of the eggs that could be saved are lost, as I find the fish does not spawn each year on the same ground and oftentimes requires from one to two days before we can locate their spawning ground. This is the third season that the experiment has been made with the pickerel, and from reports I have I consider it a very valuable work and is already showing great results. Fishermen from all over the north-eastern part of the state have reported to me that it is not necessary to line on the lakes longer than one and a half to two hours to catch their limit of twenty pounds, also the fish are much larger than they were two and three years ago.

The distribution of pickerel fry this season is 168,000,000, and the shipment of pickerel eggs to Erie and Torresdale is 40,000,000.

YELLOW PERCH WORK.

Owing to my inability to erect the new battery I was compelled to devise some means of operating the battery when there were both pickerel and perch eggs in the process of hatching.

The perch commenced to spawn their eggs before we were through hatching pickerel. To keep the fish in separate tiers I arranged a system of spouts and carried the water from the pickerel jars into a separate tier in that way kept separate, but we should by all means have two sets of batteries, one for pickerel and one for perch.

I consider the perch work of great importance. I am extremely well pleased with reports and also with personal observations of what has been accomplished. As an illustration of the success in planting yellow perch in waters to which yellow perch had not before been an inhabitant is in Hankins Pond located three miles

from the hatchery. This pond contains pickerel, bull-heads and minnows. It is a known fact that there has never been a perch caught in that pond. Our first plant was made in the year of 1904 and today fishermen are catching yellow perch weighing one-half to three-quarter pounds, and as I use this pond very frequently to procure shiners for bass food I catch from one to three hundred perch in a single hour of the same. Of course these perch are all returned to the waters. As these results have been accomplished in Hanks Pond there are other ponds throughout the state which the same results would be accomplished with persistent stocking.

Our distribution for 1907 covers a few more counties than the distribution for 1906. As this work commences about the 1st of May and closes up about the 1st of June it necessitates a large number of cans to distribute the fish and I would suggest that this hatchery be equipped with at least one thousand cans to carry on this work. The distribution for 1907 was 113,600,000 fry, six hundred one year old. The distribution of yellow perch eggs to Erie county was 44,000,000.

BLACK BASS WORK.

Early in the month of May I turned my attention to the preparation of black bass, fixing up the nests which consisted of putting on new gravel, and in addition to the nests I had located before I removed some from shallow water to the deepest channels. The weather continued cold throughout the month.

About the 2nd of June I noticed the first eggs on the nests and from that time until the 11th a great many of the nests were occupied and full of eggs. From the 9th until the 11th we had a severe cold snap, in fact so cold that ice formed on the edge of the pond, but by the 14th the weather and water changed to warmer. Upon investigation I found it did not affect the eggs at all, and a very good percentage hatched on each nest.

About this time I kept watch on the bass at the hatchery and transferred D. W. Houser, G. W. Buller and C. R. Buller to Rock Lake. They visited the lake daily for ten days and they gathered approximately 30,000 fry. Considering the great disadvantages they were working under I consider they did very well.

With the number of fry gathered from Rock Lake and the number of fry gathered from the bass breeding pond I estimate 200,000 fry. The fry were placed in our ordinary fry ponds and should have been distributed during the month of July, which were your instructions. About that time, owing to the great amount of algae in the ponds and the size of the fish, which was very small, owing principally to weather conditions, I was unable to do so.

I made an attempt later in the month of August to draw off the ponds and distribute the fish, but on account of the small water supply available at that time I found that the water got so hot after it was drawn down that the fish would die before I was able to pick them up. Unfortunately about this time the water was drawn off of Beaver Meadow Reservoir which is at the head of the Lackawaxen Creek and all the stagnant and poisonous water from the creek flowed into the ponds making them resemble a body

of water marked with Paris Green. This state continued for the next ten days and thousands of the young fish were killed. From that time on I did not disturb the ponds until the month of October when I drew off the water and cleaned up the ponds for next year's operations. The only sign of young bass remaining out of the 200,000 was twelve.

This is the second fatality I have had on account of drawing off the water of the Beaver Meadow Reservoir, and I trust there will be some means for us to guard against it in the future.

I felt extremely sorry about the loss of the bass, knowing how anxious you were to have all bass applications filled. I feel confident that we have the possibility before us here of making the propagation of black bass an ideal one, but until the funds are available to properly conduct it we will be compelled to run, hit and miss chances. In order to make it a success we should have a supply dam built at the head of the property from which we could draw and regulate our flow of water as we wish to have it, also the ponds should be reconstructed with concrete sides built from the head pan to above the water level making them absolutely water-tight.

To make the ponds conform with nature they could be re-enforced on the inner side with gravel. As I mentioned before in my other reports this work so far has been temporary and until it is made permanent we must expect some failures. The idea of having the ponds absolutely water-tight is that they are built in succession, water from one flowing into the other, and the soil being of such a leachy character we must at times flow too heavy a stream of water through the upper ponds in order to keep a supply in the lower one that destroys a great many of the fish when they are quite small, besides a number of them escaping through the lakes.

In speaking of the great drought in the month of August it was not so great that we did not have at all times an ample supply of water provided we could have controlled it, which can be done by the building of a supply dam or a reservoir.

FROG WORK.

Comparing frog work with last year's work in which I stated that the yards used for that purpose would have to be abandoned this year on account of the drive-way cutting through the yard. I abandoned the yards and used instead one of the ponds used previously for pickerel, but as the environments were not suitable my success was not great and I would advise that until such a time as the funds are available to construct proper yards you would allow me from this station to ship them in the tad-pole stage.

The output for the year was 10,000. We have ample space on the property to increase this work very much and my observations have lead me to believe that we should have plenty of room to grow large numbers.

SUCKER CULTURE.

During the month of June in drawing off one of the ponds I noticed a number of suckers, and having no use for the battery for other work I concluded to make the experiment of trying to hatch

the sucker egg. As this is a common fish, but very extensively caught throughout the different streams, I thought it would be interesting and at the same time valuable to know whether they could be propagated or not artificially.

I set up one of the jars and expressed 10,000 eggs from two female suckers, fertilizing them in the same manner as we do the brook trout. I found on working out the eggs that they remained separated while in the milt. After allowing them to remain in the milt for a period of fifteen minutes I washed the eggs perfectly clean and placed them in one of the hatching jars. When first taken the egg was very small compared with the size of the egg of the wall-eyed pike. Up until the time of hatching they had grown in size almost equal to the size of a brook trout egg and did not show the full form of the fish to the naked eye until within five days of the hatching period, when the eye and the shape of the fish showed very plainly. To my surprise every egg from the 10,000 hatched a fish.

As this seems something remarkable and it is a fish that inhabits and thrives in almost every stream throughout the State it is worthy of more attention, and I would suggest that you allow me to take up this work in addition to what other fishes we are propagating as it spawns in the time of the year when our batteries are lying idle. I have the belief, although not experimented with, that these fish can be held and reared in ponds up until they are four and five inches long, as they feed with artificial food.

CUT THROAT TROUT WORK.

Comparing the work of the cut throat trout for the year of 1907, it was a complete failure with that of 1905 and 1906. However, I am glad to state it was through no fault of mine as the eggs were dead when they arrived at the hatchery. The cause of the loss of the eggs was through the inattention of the express messengers to supply the ice chambers with ice, which is very necessary when one considers the great distance these eggs come, the length of time it takes and the season of the year.

The eggs are shipped in August and have a five day's journey from Spear Fish, South Dakota to Pleasant Mount, Pennsylvania. The temperature of the case on opening was 78 degrees. The eggs were shriveled and dry. Not a particle of ice or signs of it was in the case. As this was extremely disappointing to me I at once notified the Commissioner of the conditions and asked for a new supply. I also took the matter up personally with the superintendent of the Spear Fish hatchery, explaining the condition of the eggs upon arrival, asking him if it was possible to duplicate the order this year, but I received no reply to my communication, consequently we will have to skip the year 1907.

My reports as to the success of our previous plantings are that the fish are seen feeding in the evenings, but no reports of any being caught. However, the time was rather short from our first planting for the fish to attain a great size, but to be sure as to our success or not, with your permission I would like to this summer make a personal investigation of these lakes when I will be able to make you a more full report, and would suggest to you to make

application for a new supply this coming summer, for, if they are a success the room in the trout hatching house can be used for that purpose at a time of the year when they are bare of brook trout.

LAKE TROUT WORK.

During the month of February I received 175,000 eyed lake trout eggs from the Union City hatchery. They arrived at this hatchery in very fine condition with a loss, until all eggs were hatched, of one per cent. They were carried until the month of July when they had attained a size of one and a half to two inches, when, by your directions they were distributed to applicants for different lakes throughout this section.

I consider the planting of lake trout in the different lakes in north eastern part of the state work that should be continued, as reports are very favorable and the catching of these fish where fished for average from eight to ten pounds, and am satisfied that there would be a great many more fish caught if fishermen thoroughly understood how to fish for them.

I have made application to you for 500,000 eggs this season which you have already granted. I hope that I will be able to hatch, rear and plant them as successfully as was done this last season.

WALL-EYED PIKE WORK.

There was forwarded to me from the Erie hatchery one case of wall-eyed pike eggs for hatching and distributing into the Delaware and Susquehanna rivers from this hatchery, as it was considered a matter of economy to ship the eggs and distribute the fish from here instead of making long runs that would be necessary from the Erie hatchery.

The case of eggs I received came during the latter part of the season, and consequently a large percentage were received in bad condition. However, I placed them all in the jars and with care I was able to hatch and distribute 10,000,000, practically all planted in the Susquehanna river as far up as Bradford.

I would make this suggestion that as the wall-eyed pike or Susquehanna Salmon has become such a popular fish this hatchery should have a much larger supply of eggs in order to successfully stock the Delaware and Susquehanna and tributaries.

BULL-HEADS.

Having a spare pond at my disposal last spring and always dreading to see a body of water that is not producing I concluded to place ten pairs of bull-heads into it. The result was in the month of October I was able to distribute 22,000 from two to three inches long.

Synopsis of Work Accomplished in the Past Year.

The construction work accomplished during the past year was the repairing of the barn which I had reported previously was in a very dangerous condition and very badly located. I have now practically built a new barn out of it, raising it thirty inches, enabling

me to put in concrete basement stables to accommodate six head of horses, two cows, and harness rooms, allowing the upper floors for carriage and wagon storage. Have also taken up all the temporary hatching troughs on the south side of the building and in their place constructed two concrete trout ponds for the purpose of carrying adult trout. Built one additional concrete fry pond, extending and enlarging the main trout pond to double its former size, made preparations on the north side of the hatchery for the new hatching house, completing the floor which is made of concrete, but was unable on account of the lateness of the season to erect the building, but will have the troughs all in place and ready for the reception of the fry when the eggs are hatched. Have constructed an additional piece of stone wall bordering on the stream two hundred feet in length and four feet high. Have built a bridge spaning the Lackawaxen in front of the hatchery, length twenty-four feet, width sixteen feet.

The road leading from the main road to the hatchery was in very bad shape and owing to it being a public road I was unable to use any funds for its repair. After consulting with the township's supervisors they agreed to make application to the Highway Department for an appropriation to build a road from the hatchery to Pleasant Mount village, a distance of one mile. The contractors started work in the month of September, but owing to the frequent rains it was impossible for them to accomplish more than to put in the drainage pipes until the coming spring when we will have a fine road as entrance to the hatchery which will be a great improvement.

During the month of November we had an unprecedeted flood in the Lackawaxen Creek and owing to not having the proper guards to control the water at the head of the property I fear a loss of some of our breeding bass which we will have to provide for before the spawning season commences. The monetary loss of washing the banks was probably \$50.

The above is respectfully submitted,

NATHAN R. BULLER,
Superintendent.

FISH, ETC., DISTRIBUTED FROM DECEMBER 1, 1906, TO NOVEMBER
30, 1907.

Brook Trout, Advanced Fry.

Northampton county,	161,000
Wyoming county,	202,500
Monroe county,	375,000
Wayne county,	227,500
Lehigh county,	107,500
Susquehanna county,	197,500
Carbon county,	255,000
Total,	1,486,000

Brook Trout, Fingerlings No. 1.

Huntingdon county,	20,000
Long Island,	20,000
Luzerne county,	78,000
Columbia county,	127,500
Sullivan county,	163,500
Lehigh county,	120,000
Lackawanna county,	93,000
Carbon county,	45,000
Susquehanna county,	57,000
Monroe county,	125,500
Wayne county,	160,500
Total,	1,110,500

Pickerel Fry.

Lycoming county,	2,000,000
Wayne county,	29,000,000
Susquehanna county,	12,000,000
Northampton county,	5,500,000
Snyder county,	3,000,000
Union county,	2,400,000
Northumberland county,	10,500,000
Luzerne county,	20,000,000
Sullivan county,	3,700,000
Lackawanna county,	20,000,000
Carbon county,	12,000,000
Wyoming county,	17,000,000
Pike county,	19,000,000
Monroe county,	11,000,000
Bradford county,	1,000,000
Total,	168,100,000

Yellow Perch, Fry.

Wayne county,	29,000,000
Lackawanna county,	7,000,000
Pike county,	4,000,000
Schuylkill county,	6,000,000
Susquehanna county,	25,000,000
Wyoming county,	12,000,000
Tioga county,	8,000,000
Snyder county,	8,000,000
Northumberland county,	4,800,000
Carbon county,	5,200,000
Union county,	2,600,000
Luzerne county,	2,000,000
Total,	113,600,000

Yellow Perch, One Year Old.	
Crawford county,	600
Lake Trout, Advanced Fry.	
Susquehanna county,	6,000
Carbon county,	40,000
Wayne county,	105,000
Total,	151,000
Wall-eyed Pike, Fry.	
Bradford county,	10,000,000
Bull-heads or Catfish.	
Wyoming county,	3,000
Wayne county,	13,000
Susquehanna county,	2,000
Luzerne county,	1,000
Carbon county,	3,000
Total,	22,000
Suckers, Fry.	
Susquehanna county,	10,000
Tad-poles.	
Carbon county,	10,000
Summary.	
Brook Trout, fry and fingerlings,	2,596,500
Pickerel,	168,100,000
Yellow Perch,	113,600,600
Lake Trout,	151,000
Wall-eyed Pike,	10,000,000
Bull-heads or Catfish,	22,000
Suckers,	10,000
Tad-poles,	10,000
Total,	294,490,100

Distribution of Pickerel Eggs.	
Erie county,	20,000,000
Philadelphia county,	20,000,000
Total,	40,000,000

Distribution of Yellow Perch Eggs.	
Erie county,	44,000,000
Distribution of Brook Trout Eyed Eggs.	
Corry,	500,000
Spruce Creek,	500,000
Carbon,	50,000
Total,	1,050,000

Brook Trout Eggs Received 1907-08.	
From Glen Eyre,	269,000
Weissport,	720,000
Penn Forest,	720,000
Total,	1,289,000

TORRESDALE HATCHERY, STATION NO. 5.

Report of Jerry R. Berkous, Superintendent.

Hon. W. E. Meehan, Commissioner of Fisheries.

Sir: I take great pleasure in presenting my second annual report of the Torresdale Station No. 5, from December 1st, 1906, to November 30th, 1907.

The general condition of the station is good at the present time. The hatching house is in fine shape and everything ready to start hatching when the spring work commences.

I was somewhat disappointed in not receiving any surplus white fish and lake herring eggs from the Erie hatchery, but I understand that on account of the hard blows on the lakes the spawntakers were unable to secure only enough to fill the Erie and Crawford hatching houses. On account of expecting surplus eggs from the Erie hatchery, I fitted the hatching house up in first class shape. I cleaned the two batteries thoroughly and gave them both a good coat of paint. I replaced the broken tubes and also the broken tops to the McDonald hatching jars, besides replacing about one hundred new spiggots which were worn out. By your directions I gave the contract for putting up two seven thousand gallon water supply tanks. Then I started building the foundation and trestle work for them to sit on, and set them up about twenty feet from the ground. After they were set up I gave them both two good coats of paint, white and green. Then I connected them up so as to pump into them with either pump, also connecting the original old tank with them, and had the overflow of the tanks arranged so as to feed into the gold fish pond, then back through the five fry ponds by the hatching house and the large catfish pond. By doing this no water goes to waste. I find by testing the tanks that they will run the hatching house at full capacity for about three hours, where the old one would only run the batteries for about twenty minutes. They will be a saving of at least one-third the fuel used to pump the water. And by always keeping them full of water they will be a safe protection against a break in the machinery of the boiler or the pumps.

In referring to my last year report I note the putting on of an extra intake pipe from the hatching houses to the yellow perch pond to prevent trouble, on account of the clogging of the pipe that runs into the river when the ice breaks up in the spring. I found the work to be a great success. I found that the yellow perch pond supplies a great deal more water than is taken to run the batteries. I also found that the water is about two or three degrees warmer than the river water, and on an average much cleaner, and in general gives a great deal better satisfaction. Now that I find it to be a success to use the water from the yellow perch pond instead of the Delaware river, I will replace the

pipe by one of a larger size, since a three inch pipe is barely large enough to give a sufficient quantity of water. It furnishes enough water to run the hatching house at full capacity, but that is all. The consequence is that through the hatching time I have no overplus water for the gold fish pond, nursery ponds and the catfish pond. Second, that the three inch intake pipe is a little too small for the size of the pumps. But this difficulty will soon be overcome. With your consent I bought the necessary fittings and four inch pipe, enough to complete the job. I will take up the three inch pipe and replace it with the four inch sometime in the near future. But I strongly recommend that the intake pipe No. 1 leading to the Delaware river still be kept in service, on account of some accident which might occur. I also wish to say that both the Warthington and Union pumps are in first class working order at the present time.

WHITE FISH.

On the 1st of December, 1906, I received from Superintendent A. G. Buller, of Erie, two cases of white fish eggs, which arrived in very nice condition. About eight days later I received two more cases which did not look quite so good, but were classed as fine eggs at that time of the spawning season. I started the pumps, turned the water into the batteries and commenced my fish work in the hatching house of the Torresdale hatchery.

I ran the pumps day and night and kept the water running constantly through the eggs until they were all hatched, with the exception of two short stops of the pump, the first stop for about one hour, and the second for about two hours. The first stop was caused by a piece of ice getting into the intake pipe, and the second one was caused by a valve wearing out on the boiler. By keeping the men constantly at work feathering the eggs, the stoppage was of very little injury to them, and I succeeded in hatching eighty per cent. of the stock.

On the 11th of March I noticed the first lot of eggs commencing to hatch, and the 15th of March I made my first shipment to Lake Erie. I made four shipments in all, or a total of one hundred and forty six cans of young fish to Lake Erie. By all reports they arrived at the Lake in good condition.

YELLOW PERCH WORK.

Starting at the yellow perch work on March 15th I commenced putting branches around the large perch pond for the breeders to deposit their spawn on. On the 4th of April, I gathered the first spawn, thirty-five strings in all, the first day. These eggs were placed in the hatching jars at once. The fish continued spawning to May 10th. I gathered as high as one hundred and fifty strings in one day. With the best of attention I could give them, I succeeded in hatching ninety-five per cent. of the eggs gathered. I wish to say that the stock of fish that I have are extra large. I have fish that would measure over a foot in length, and I gathered strings of eggs that measured over seven feet, or at least five times as long as the largest perch. I am very glad to state that owing to the field work at this station, I have increased my stock of adult

perch from 1,100 to about 3,000. I had about one hundred and fifty fish die after the spawning season and I succeeded in turning out 45,000,000 perch fry.

I filled all the applications from the various parts of the state, and made several plants of young fish in the Neshaminy and Pennypack Creeks, besides planting several million in the Delaware river. I also stocked a large fry pond at the upper end of the grounds which I had been working on at odd times through the winter and had just completed before hatching time. I am sorry to say the planting in the fry pond has proven to be almost a failure, due to two reasons; first on account of the pond being new; second, on account of not having the time to give the fish the proper attention and the food that they should have had. I think at a rough estimate that there are from two hundred to three hundred left.

Yellow perch generally spawn during the night or towards the morning, although once in a while they seem to take a contrary notion and a number of them deposit their spawn in the daytime. The eggs are fastened together by what appears to be a thin skin and the whole forms a broad flat lace-like ribbon, but shaped like the bellows of an accordian. The color is yellowish white. The strings are from a foot and a half to over seven feet long, according to the size of the fish, and each string is several times larger than the fish.

The strings are fastened generally to the brush and so lightly that a little wind or over much current will sweep them away. As the eggs are semi-buoyant, if the current is anyway strong they will be swept to the shore and sometimes above water mark, where, if they are not gathered immediately they will die. The same holds good with pickerel eggs, which resemble the yellow perch very closely. The eggs are larger and the strings therefore larger. I have seen strings of pickerel nine feet long. They are lighter in color, too, than the yellow perch.

Our method of gathering yellow perch eggs was to enter a boat, carrying a bucket and a scrap net, and row along the edges of the brush, which as I have before mentioned, I had previously placed in the water along the banks. By means of the scrap net, we gathered up the strings of eggs, both those fastened to the brush and those which had broken loose and were resting on the bottom of the pond. The ribbons or strings of eggs when fastened to the brush are not stretched out, but are generally crumpled up as one would crumple up a handkerchief in the hands. It was rare to find a string nicely stretched out. The only exception to this was at the upper end of the pond where a number of strings had been deposited on the brush near where the water came in from the sunfish pond, and it was the water which stretched out the string and not the fish.

When our bucket was filled with eggs, we took them to the hatching house where they were emptied into a tub into which we had previously put a few inches of water. Then we took hatching jars, poured about a quart of water into each and then by means of our eggs funnel poured in strings until the jar was filled within six inches of the top. The jars were then set on the stand of the battery, the glass tube adjusted and the water turned on very slowly.

Yellow perch eggs do not want a very strong flow, in fact, if we did turn on very much water, as much as we would for wall-eyed pike for instance, we would not have eggs in the jars five minutes. We only turn on just enough to give the slightest motion to the strings. In fact, unless we look very closely we could not see any motion at all. It takes from fifteen to twenty days to hatch yellow perch from the green egg in the water at Torresdale when the temperature was from 50 to 54 degrees.

I have never seen fish eggs that required so little attention paid up to the period when the eyes begin to form. From that time on I never saw any eggs, except wall-eyed pike eggs, that would keep a man so close to the jars as yellow perch and pickerel eggs. As the eyes begin to form the skin or gelatine which holds the eggs together seems to rot and the ribbons begins to break up into small bunches. The eggs in the first place are only semi-buoyant, but when the strings begin to break they are apt to get almost as buoyant as cork at times. I have seen whole jars of eggs resting apparently solidly in the bottom, suddenly rise, and that within five minutes, and if it were not for screens which we place across the back of the lips of the jar they would all flow out into the trough.

If the jar happens to be pretty well filled when the rise comes it sometimes happens that the eggs will actually rise to such a height as to flow from the top of the jar, swelling like dough in a dough pan. Thus from the time the eggs begin to eye it is necessary to keep men at the battery night and day. Even then sometimes when there are one hundred and fifty to two hundred jars to look after, one man will have just as much as he can do, for before he can finish attending to one rising jar, five or six will be rising elsewhere. I have seen one dozen or more jars rise almost at once. Of course this must not be allowed even where the eggs are kept from escaping from the jar, so we turn off the water supply. In the course of two or three minutes the eggs will sink to the bottom when the water is turned on again with a reduced amount. As the supply of water is always small it therefore follows that more air gets into the jar because the tubes are scarcely filled with water and it is this air which helps to raise the eggs. By turning off the water little by little that air escapes so that when it is turned on again it is sometimes several hours before the eggs rise and need attention.

I have handled many different kinds of fish eggs, but I never met with any that can be handled as roughly as yellow perch. One can do almost anything with them. They can be taken from the jars three or four times a day and washed if necessary without any harm. Dead portions can be pulled or torn or cut away from those which are alive without hurting the live eggs. Strange to say, while this is a fact with yellow perch, it is not true with pickerel eggs, although the two are so nearly alike as to be very difficult to tell them apart. There are no eggs that require so gentle handling as pickerel. If they come in from the field with grass and sticks and leaves they must go in the jars in that manner. Any attempt to clean this foreign matter out endangers the eggs. And so washing hurts them. But dirt and sticks with pickerel eggs does not seem to hurt them.

as it does others. Mr. Nathan R. Buller, and Mr. Meehan both tell me that the yellow perch hatch in greater quantities during the night at the Wayne Hatchery, but this has not been my experience here at Torresdale. The greatest number of eggs come out early in the evening and early in the morning and large numbers come out early in the afternoon and quite a number would hatch even in the morning near the noon hour. As a matter of fact, I could not see very much difference except early in the evening or early in the morning. I could not see any difference whatever with the pickerel as to the time of coming from the egg. When they commence to hatch there was a steady flow both day and night.

The yellow perch when hatched are so small that meshes of our shad screens were too coarse to hold them in the fry tanks. At first I thought I would have to use cheese-cloth but I succeeded in finding a wire netting with meshes about as fine as cheese cloth and used it.

SMELT WORK.

By your directions on the 17th of April I went to Cold Springs Harbor, Long Island, and returned the following day with five million eyed up smelt eggs which carried through in good shape and were very nice eggs. I placed them in the hatching jars and they hatched out in about a week. There was practically no loss after I received the eggs. I turned the young fry over to N. R. Buller, who planted them in an inland lake in Wayne county.

I found the hatching of smelt eggs very easy, by following instructions given me both by Mr. Walters of the Cold Spring Harbor Hatchery and Mr. Safford and Mr. Meehan, I found though it quite different from other work. The eggs are the smallest I have ever seen. It requires 500,000 to fill a liquid quart and they are as small as mustard seed if not smaller. Smelt eggs will not hatch when exposed to the light. There was too much light even when I closed the window shutters, and to give them sufficient darkness I had to hang a dark cloth curtain in front of them. The prevailing opinion that small fish give fry of a pretty good size does not hold good with these fish because the fry of the smelt is so small that I had to use a screen of linen, and double at that, to keep them from escaping after they were in the fry tank and even then a few managed to wriggle through.

They started to hatch about ten o'clock at night and in less than a half hour the entire 5,000,000 were hatched. I thought that a single sheet of linen would be sufficient to hold them. They began to hatch when I was in the dwelling house and the watchman called me. When I got to the hatching house I found the little fish coming through the single thickness nearly as easily as I could go through a door.

WALL-EYED PIKE.

The early part of May I received two different lots of wall-eyed pike eggs from the Erie Hatchery. The first lot were fairly good for wall-eyed pike, but the second lot were the last of the spawning and was a very bad batch of eggs. Out of the whole lot I hatched about 60 per cent.

CHAIN PICKEREL WORK.

These eggs were sent me from the Wayne Hatchery. They came in two lots, about seventy cans in all, and were a very fine lot of eggs. The second lot were nearly all eyed up when they arrived and there was little loss in them. They hatched out in about ten days and after the applications were all filled the remainder of the fry were planted in the Delaware River, and large streams that flow into it.

SHAD WORK.

On May 5th I received my first shad eggs from a gill net fisherman. They were from only one fish but were nice eggs. It was about one week before I got any more eggs on account of a cold wave which lasted for about that length of time. While the cold wave lasted of course the water got much colder and there seemed to be no shad in the river. My opinion is that the cold water drove them out and down the Bay where the water was deeper and much warmer.

As soon as the weather commenced to get warmer, the water got warmer and then there was lots of shad in the river again. Soon after this the eggs commenced to come in again, but very slow. By this time I had seen most of the fishermen in person and made arrangements with the most of the gill net fishermen to take their own eggs. Then I stationed my men and we commenced shad work on the Delaware in earnest. Being my first year in the culture of shad I took very much interest in the work and the progress of it.

With one of my best men, Mr. Nesley, I took the most important shore net grounds, known as the Murray fishery, and operated by Mr. John Page, to whom we owe many thanks for the kind way in which he treated us and for the 2,065,000 eggs that we got from his fishery. With the exception of two or three days, I was at the fishery when in operation, and when I was absent Mr. Nesley was on hand to look over every fish that was caught and see that no eggs were lost. The one particular thing that I noticed among the shad that were caught was that most all of the roe shad or the greater percentage of them looked and felt as though they needed only about twenty-four hours to ripen them up enough to spawn, and they continued to be that way up until the last of the spawning season. This was the general complaint made by all the fishermen on the Delaware.

On one occasion I got 98,000 eggs from one shad from the Murray fishery. One very important and interesting experiment I had with a roe shad nearly ripe was to take several and pen them in a small pond to try and ripen them enough to take the eggs, but failed. On one occasion I removed one from the net by means of a live ear and held it in a small pond over night and it was still alive the next morning, but it died through the day. The eggs did not ripen, but I think that this method can be successfully carried out by contriving some plan of taking the fish out of the shore net by means of a live ear made on purpose for the occasion, not allowing the fish to be out of water, or not touching the fish with the hands. I intend giving this question a more thorough test another year.

One very important and curious instance of fertilization happened with one of the gill net fishermen which I wish to speak of. Messrs.

Demerich and Son, two very reliable men, while picking their fish out of the net laid out three fish for the purpose of taking the spawn of these three, two roes and a male, as they supposed. As soon as they got the time the son started to take the eggs. He took the eggs from the two roe shad in a pan. Then he took the supposed male to impregnate the eggs, and found it to be a spawned out female. Then they were "up against it," so to speak. They had a pan of eggs and not a male in the boat to fertilize them. The son proposed throwing the eggs overboard, but the father objected and set them in the shade of the boat and made another drift for the purpose of getting a male. The first one they came across they stripped and fertilized the pan of eggs that had been in the shade of the boat from two and one-half to three hours. Then they brought the eggs to the hatching house and turned them over to me, saying nothing about the experiment they had tried. I washed the eggs and started them in the hatching jar. The next morning they both came to the hatchery on purpose to see how the eggs turned out, and when I gave them their card crediting them with nearly all good eggs they would not believe it until they had seen the eggs. They were as nice eggs as I had in the house the whole season.

On different occasions where there was a scarcity of male shad there were male herring used instead to fertilize the shad eggs and a large percentage of them would hatch, but not as big a per cent. as where the male shad used. I wish to thank the fishermen through you for the interest they took in the shad work on the Delaware River.

By your directions I got the twine and rigged up a small gill net which I operated by the hatchery help at odd times and evenings and by so doing I got over 300,000 eggs from our own net. I strongly recommend that another season we rig out a small shore net if we can locate a shore somewhere near the hatchery in which to operate it, for two particular reasons; first, for the purpose of getting the eggs from the ripe fish that we catch; second, for the purpose of getting the roe shad that are not quite ready to spawn and penning them into a small pond which I will have prepared for them and try to hold them until the eggs can be taken.

FROG WORK.

In the early part of April, I secured from field work connected with this station, frog spawn enough to stock all of my ponds, besides sending Spruce Creek twenty-five quarts of eggs. These hatched out and seemed to be doing fine when very suddenly there came a heavy rain and flooded the pond, and what were not washed out of the ponds died in a short time afterwards. I owe the cause partly to the oily water which remained in the ponds for several days.

I am very glad to say that the eggs that we got from our own adult frogs from the last spawning, or second spawning, which took place in July, turned out very good, and I succeeded in shipping out 16,930 very nice ones. I have large frogs that will weigh over a pound, and on one occasion I measured a tad-pole that measured six and one quarter inches.

GOLD FISH WORK.

My large gold fish carried through the winter in good shape and looked very healthy in the spring. They commenced spawning in May and spawned very heavy and there were an amount of little fish in the pond. But at this time of the year my time was taken up with the shad work and I did not give them the close attention that I should have done. Consequently, before I knew it there were thousands of little fish of various kinds pumped from the river by means of the intake pipe into the pond and they were all preying on the young gold fish. The consequence was that they ate up all the first spawning, and they the best fish.

I wish to state that Mr. John Fowler, head gardener on the Foerderer estate presented us with about four hundred very nice gold fish.

LARGE MOUTH BASS.

About two or three weeks before the spawning time I drew the water from the pond that the adult bass were in, and transferred them to their new pond that was completed the winter before, and I was very much disappointed when I took them out in finding only about one hundred bass and of these there were more than two-thirds males. As spawning time arrived they commenced to fight and chase one another around the pond. The consequence was that there were only two nests in the whole pond hatched out. But I want to say that I secured a few young fish by field work done by myself and assistant in Berks county. I put them in the new bass fry pond that I had completed during the winter months. They did fine and were the nicest bass fry for their age when I shipped them that I ever saw, although I lost nearly fifteen per cent. from cannibalism. Very nearly all the feed they received was food fish that I got from the river for them. I also wish to say that I have increased my stock of adult bass. I received about eighty from the Union City Hatchery.

SUN FISH WORK.

My sun fish work was with Lake Erie blue gills, and long eared, principally, although I had some yellow perch and common. The sun fish pond at the time of spawning was one mass of nests and was a great sight to the many visitors who visit the hatchery.

After the eggs were hatched the pond was just one great school of little fish and was a wonderful sight to look at, but owing to the creek running through the pond and having no way to regulate the flow of water at the time of the many hard rains of the summer, the water carried a great many thousands out through the screens into the river. But this difficulty has come to an end. By the use of the House of Correction labor, I had a new sun fish pond made about fifty feet wide with a very nice gravel bottom, and the water way which will be very easily regulated. I have disposed of all the yellow and common sun fish and by your orders will transfer the Lake Erie blue gills and the long eared sun fish to the new pond early in the spring.

Cat-fish work I find to be very interesting on account of the way both male and female protect their eggs in the nests, and also the young fish. I find in cases where the old fish are caught or killed and the young ones left that another old fish will gather up the young and look after them. Often times in a school of young fish we will find four or five different ages of young fish.

On account of the severe winter the frost got into the banks of the cat-fish pond and heaved them so that the pond would not hold water and there was only about eighteen inches left in the kettle. I could not fix the leaks on account of so much frost in the ground. Neither could I fill the pond with water. About nine inches of ice formed on the pond at one time leaving not quite one foot of water for the fish.

In the spring as soon as the ice disappeared I took the fish out and they all looked apparently in good condition, but just before spawning time they commenced to die, and I lost about half of my entire stock. I lay the cause to two reasons; first, the fish getting chilled from the lack of water through the cold weather; second, there are always a great many cat-fish die just before spawning time. But by the help of the fishermen and the field work connected with this station, I soon replaced this stock of cat-fish and as a result had a very nice output of young fish.

WHITE PERCH WORK.

By means of field work in early spring time, I secured some very nice white perch. Having no pond for them I placed them in the large cat-fish pond and paid very little attention to them with the exception of feeding them. This fall, when I drew off the pond I had one thousand very nice young fish, which I planted in the Delaware River. As the white perch are very nice fish I ask your permission that by means of Correction labor to build a pond for them next spring.

CONSTRUCTION WORK.

In the mid-summer by your request a gang of men from the House of Correction was sent to me at the hatchery by the orders of Director of Public Safety, Mr. Henry Clay. First I started grading the yard between the dwelling house and the river front, but shortly afterwards by your directions I started them in directly above the frog ponds, clearing the brush on the east side of the creek through to the upper end of the grounds. After this work was completed I started them in the new sun fish pond directly above the new bass pond which they completed the fall before. The new sun fish pond is a beauty, a pond about fifty feet wide with a fine white gravel bottom and natural gravel banks. After this pond was completed I put the gang at work straightening the creek which runs through the center of the property. After this work was done I proposed by your permission to put the gang at work straightening a nook on the west side of the bass pond, which will beautify the pond and also give us much more of a spawning area which is very badly needed.

First I completed the two new fry ponds at the upper end of the grounds which was started last fall. Then I tore out the wooden frame work of one of the fry ponds near the hatching house which would not hold water and made it over with concrete sides and bottom. Knowing that your intention of turning the gold fish pond into a calico bass pond near the hatching house that will not hold water on account of the sandy soil, be made over with concrete and both be made into one large pond. Then, work of propagating gold fish be done in this pond. I found on account of the many hard rains of the summer that the main sluice ways of the yellow perch and the old sun fish ponds were not large enough to give the water during heavy freshets, a chance to run off. To make the ponds safe from the danger of high water, I tore the old wooden sluice way between the river and the perch pond out completely and replaced it with a large concrete archway about forty feet in length, five feet in width and nine inches thick. The driveway passes from the dwelling house to the hatching house over the arch.

I put in another concrete sluiceway from the old sun fish pond to the yellow perch pond, putting a concrete arch over it under the roadway from the main entrance to the hatchery grounds, and so getting rid of the bridge which had been there.

By the frequent trimming of the hedge which runs partly around the lower part of the grounds I have succeeded in getting a very pretty hedge.

The general conditions of the grounds are fairly good.

One of the interesting features of the work of this hatchery is the field work connected with this station for the purpose of collecting young fish for distributing and for the purpose of collecting adult fish for the stocking of our own ponds of the different hatcheries of the State.

For example, with the aid of my employees and the fishermen of the Delaware River, I have received since the first of November of this year:

Adult cat-fish,	454
Yellow perch,	223
Large mouth bass,	25
Pike,	5
Swan bass,	5

Before closing my report I wish to refer to the Auxiliary No. 1 of the Torresdale Station, owned by Mr. Bromley Wharton, near the Neshaminy creek and operated under my supervision. He has two very beautiful ponds, one of large mouth bass and the other of Lake Erie sun fish.

On account of the very busy season it was not often that I visited the place through the summer, but enough to know that Mr. Wharton was doing good work in the rearing of fish for Neshaminy creek. Here is at present a large stock of fine sun fish for spring planting. Mr. Wharton will give full details in his report to you.

On the 10th of November, I received orders from you to report to N. R. Buller, who was taking trout eggs at the Wolters hatchery and found a very nice healthy stock of fish, and also an up-to-date hatchery.

On the 15th of November, I went to the Penn Forest Hatchery under your orders where I took full charge of the hatchery through the brook trout spawning season.

In closing my report I wish to thank you for the many valuable suggestions you have given and the courtesy you have shown me.

Hoping that we all may be able to greatly enlarge our output of fish the coming year, I remain

Respectfully,
J. R. BERKHOUS.

DISTRIBUTION FROM TORRESDALE HATCHERY, FROM DECEMBER 1ST, 1906, TO NOVEMBER 30TH, 1907.

White Fish Fry.

Erie county,	6,100,000
Total,	<u>6,100,000</u>

Smelt Fry.

Wayne county, planted by the Department,	5,000,000
Total,	<u>5,000,000</u>

Wall-eyed Pike.

Adams county,	100,000
Bucks county,	3,000,000
Delaware county,	200,000
Huntingdon county,	400,000
Juniata county,	1,100,000
Luzerne county,	100,000
Lebanon county,	100,000
Montgomery county,	2,000,000
Philadelphia county, planted by Department,	986,250
Pike county,	1,000,000
York county,	1,100,000
N. J. Fish Comm. in exchange for other fish,	1,000,000
Total,	<u>11,086,250</u>

Shad Fry.

Delaware river,	5,834,000
Total,	<u>5,834,000</u>

Yellow Perch Fry.

Adams county,	625,000
Bucks county,	3,125,000
Berks county,	3,000,000
Bedford county,	1,625,000
Blair county,	500,000
Cumberland county,	750,000
Cambria county,	625,000
Chester county,	1,875,000
Dauphin county,	2,625,000
Delaware county,	250,000
Franklin county,	125,000
Fulton county,	500,000
Fayette county,	250,000
Indiana county,	750,000
Juniata county,	250,000
Lancaster county,	1,250,000
Lehigh county,	1,250,000
Lebanon county,	6,000,000
Montgomery county,	2,625,000
Northampton county,	625,000
Philadelphia county,	3,125,000
Planted by Department,	7,250,000
Perry county,	1,750,000
Somerset county,	1,250,000
Westmorland county,	1,625,000
York county,	1,375,000

Total,

45,000,000

Frogs.

Adams county,	400
Berks county,	600
Bucks county,	300
Chester county,	1,100
Huntingdon county,	4,000
Lebanon county,	1,300
Lehigh county,	200
Montgomery county,	1,700
Mifflin county,	5,000
Northumberland county,	100
Philadelphia county,	100
York county,	2,130

Total,

16,930

Gold Fish Fingerlings.

Philadelphia Schools,	400
Philadelphia Police Station,	115
Total,	<u>515</u>

REPORT OF THE

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Gold Fish, Adult.	
Philadelphia Schools,	100
Philadelphia Police Station,	38
Total,	138

Large Mouth Bass.	
Chester county,	850
Delaware county,	150
Lancaster county,	150
Montgomery county,	500
Total,	1,650

Sun Fish, Small.	
Berks county,	3,000
Bucks county,	750
Chester county,	625
Lancaster county,	875
Lebanon county,	250
Montgomery county,	4,250
Northampton county,	1,125
Philadelphia and Delaware River,	5,500
Schuylkill county,	1,500
York county,	1,125
Total,	19,000

Sun Fish, Large.	
Montgomery county,	330
Total,	330

White Perch Fingerlings.	
Planted by Department in Delaware River, Philadelphia county,	1,000
Total,	1,000

Cat Fish Fingerlings.	
Adams county,	500
Berks county,	1,300
Bedford county,	400
Bucks county,	700
Cambria county,	100

Carbon county,	600
Chester county,	600
Cumberland county,	100
Erie county,	1,600
Franklin county,	300
Huntingdon county,	200
Juniata county,	200
Lancaster county,	500
Lebanon county,	200
Monroe county,	1,000
Montgomery county,	1,000
Montour county,	200
Northampton county,	300
Philadelphia county,	1,200
Schuylkill county,	300
Snyder county,	100
Union county,	1,200
York county,	600

Total, 13,200

Large Cat Fish.

Erie county,	400
Philadelphia county,	140
Total,	540

Chain Pickerel Fry.

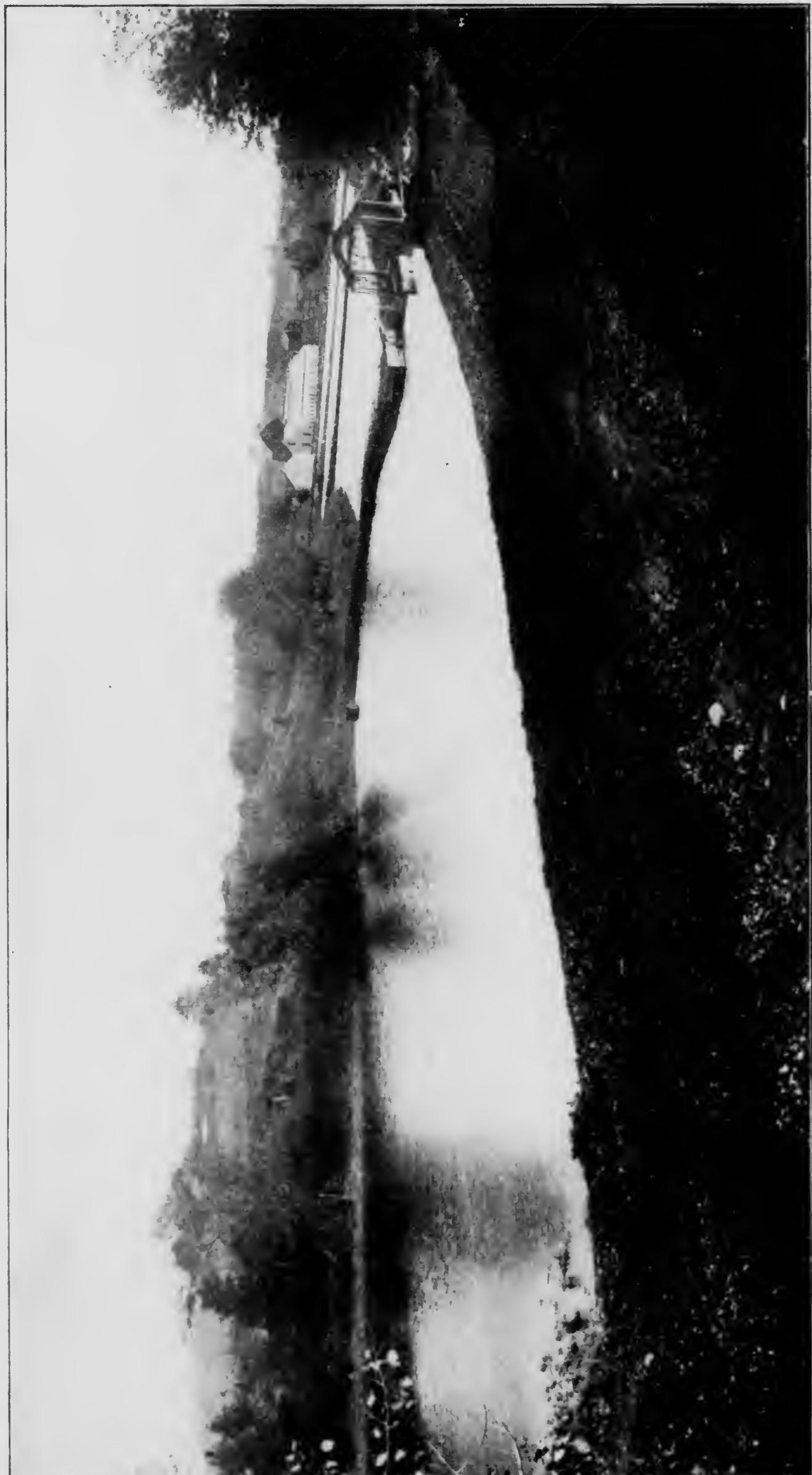
Adams county,	1,200,000
Blair county,	900,000
Berks county,	1,500,000
Bedford county,	1,800,000
Bucks county,	17,100,000
Cumberland county,	1,200,000
Delaware county,	600,000
Dauphin county,	600,000
Fayette county,	300,000
Franklin county,	4,200,000
Juniata county,	600,000
Lebanon county,	9,900,000
Lancaster county,	2,100,000
Montgomery county,	600,000
Mifflin county,	300,000
Philadelphia,	3,600,000
Planted by Department,	15,000,000
York county,	1,500,000

Total, 63,000,000

Grand Total, 136,073,553

Summary.

White Fish,	6,100,000
Smelts,	5,000,000
Wall-eyed Pike,	11,086,250
Shad,	5,834,000
Yellow Perch,	45,000,000
Frogs,	16,930
Gold Fish Fingerlings,	515
Gold Fish, Adults,	138
Large Mouth Bass,	1,650
Sun Fish, Young,	19,000
Sun Fish, Adults,	330
White Perch,	1,000
Cat Fish, Fingerlings,	13,200
Cat Fish, Adults,	540
Pickerel,	63,000,000
<hr/> Total,	<hr/> 136,073,553
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ERIE AUXILIARY—A View of a Portion of the Hatchery.

ERIE AUXILIARY HATCHERY, STATION NO. 6.

Report of A. G. Buller, Superintendent.

Hon. W. E. Meehan, Commissioner of Fisheries:

Sir: The following is my report from December 1st, 1906, to November 30, 1907.

I find the first thing I will have to mention will not sound very encouraging, but fortunately our one serious mishap for the year ended on the night of December 5th. We lost our adult black bass, about eighty in number on that night. The ground had been covered with snow, and on the night I mention there was a heavy rain, which caused the creek to raise rapidly. The screen at the splash became clogged with leaves and other matter, which caused the water to overflow the banks and tore out portions of those ponds. One of these ponds contained the black bass I mentioned losing. I hoped to recover most if not all of the lost fish later, thinking they had landed in an ice pond which the creek runs through about one mile below the hatchery. I made arrangements with Mr. Peters who owns the pond to have it drawn down, but sorry to say, we did not find the fish. During the month of December, I received 210,000 lake trout eggs that were gathered by the crew on the Tug Rocket, which fished out of Erie. On January 12th, I received 2,500,000 lake trout eggs from United States Bureau of Fisheries, Northville Station, Michigan. These eggs were already eyed and exceptionally good. On account of the weather conditions, we were not able to repair the damaged ponds therefore the supply of water in the hatching house was rather low. I found it necessary to send 1,000,000 of the eggs to the Corry Hatchery to be cared for. You also instructed me to ship 150,000 eggs to the Wayne Hatchery. During the month of April, I received seventy-five adult yellow perch from the Corry Hatchery. We gathered 168,000 perch eggs from the pond in which these fish had been placed. The eggs were sent from the Erie Hatchery to be hatched in the jars. We also received 15,000 frog eggs from the Erie Hatchery and placed them in the frog ponds. I am sorry to report these eggs did not hatch. I attribute the cause to the severe weather we had after placing them into the ponds. The ponds had been covered with ice at different times. However, I was able to gather 12,000 tadpoles later in the season from the yellow perch pond. I noticed quite a number of frogs in the large ponds. I believe the frogs will multiply from year to year, and in this way we will be able to gather large quantities of young tadpoles. As early in the spring as possible, we repaired the banks of the different ponds which had been damaged during the flood. When this was finished, I prepared the black bass pond for the season's work, and placed a large number of artificial nests in the shallow parts.



ERIE AUXILIARY—A View of a Portion of the Hatchery.

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You instructed me to be prepared for the reception of a large amount of mature fish of different species, which were to be collected at Erie. This consignment consisted of ninety-five black bass, one hundred and twenty-three large mouth bass, two hundred and eighty-three calico bass, two hundred and nine rock bass, seventy-six yellow perch, four hundred and forty-four sunfish and sixty-three bull-heads.

The first black bass were received on June 5th. At the time the fish were placed in the pond, the temperature of the water was fifty degrees, and remained the same until June 11th, gradually rising from then on. We watched the nests closely and on the seventh day of June found the bass had begun to work. However there were few nests cleaned until June 12th. From the 11th to the 15th day I found twelve nests filled with eggs. From this on the work progressed rapidly. I noticed quite a number of natural nests had been made before many of the artificial nests were occupied, also that the nests were built from three to six feet apart, and two nests had been built against the artificial nests. The depth of water where the natural nests were built was from one to three feet deep.

All the articles I have read and discussions I have heard on bass work have been to that effect that the nests must be placed quite a distance from each other, but as I have said some of the nests in our pond were very close, and I did not notice that one single nest had been disturbed in any manner.

The eggs began hatching on the 17th, and on the 20th I noticed the fry on a number of nests were ready to raise. We cribbed these nests at once. The parent fish seem to take the same watchful interest in the young fish as they had before being cribbed. They would swim around the crib and were continually on the watch. When the fry were removed, the parent fish became quite angry, so very angry that on different occasions cribs have been knocked over by the fish while the dip nets used in taking up the fry has been badly torn by the fish catching it in his mouth and giving it a vicious jerk.

We removed the last fry from the cribs on July first. The ponds into which the fry were placed were new. Having been finished but a short time before, there was nothing for the fry to feed upon with the exception of a very small amount of Chara which had been placed in the ponds when finished. I found the ponds were overstocked with the large amount of fry we placed in them, so I asked you, Mr. Meehan, for permission to make a plant in Presque Isle Bay of the first fish hatched. You instructed me to plant 50,000 fry. The fish were planted on July 6th. The ponds which contained the fry with the exception of one, were supplied with creek water—one pond was supplied with spring water, the temperature of which was 55 degrees. I noticed the fish in this pond grew slowly and on the 28th day of July I discovered the little fellows were covered with fungus. I used salt freely but to no avail. In three days time the entire lot of fish had died.

As the fish in the other ponds were in a healthy condition and growing nicely, I feel the trouble was caused by the cold spring

water. We were able to ship 22,650 fingerlings. Numbers one, two and three, or in other words, filled all the applications sent to me.

I had hoped to raise a large number of young fish, but the largest fry pond which contained no less than 50,000 proved to be a great disappointment to me. I never noticed any dead fish in this pond which is quite large and about four feet deep in the centre, until the fish became the size of one and one-half inches long. We could see large schools of them close to the banks. The fish were fed daily on small minnows which were collected in the upper dam and along the creek. As the time went on, we did not see so many fish along the banks, but we naturally thought they were staying in deeper water. You said if I could spare two thousand young bass I should ship them to Spruce Creek hatchery, so on August 17th we drew down the pond in order to get the fish. Imagine my disappointment in finding but one hundred and fifty fish. This proves their canabalistic nature.

For want of space it was necessary to place the sunfish, rock bass and calico bass in one large pond, which was in June. A few days after the fish were placed in the pond we noticed the rock bass and sunfish busy preparing their nests close to the banks, but could not see the calico bass working. The latter part of June the pond close to the banks was alive with little fish. I placed a large quantity of brush in the pond to afford the little fellows hiding places.

October 2d, I drew off the pond in order to remove the small fish. I was pleased to find the pond filled with thousands of young fish. On account of not seeing any of the calico bass working I did not expect to find young calico bass, but to my surprise found a large number of these fish were calico bass. It was a pleasing sight to see the size they had grown in that length of time. They were three months old, some of them measuring three and four inches long. You instructed me to send five hundred calico bass to the Torresdale hatchery, and the same amount to the Crawford hatchery. I retained one thousand for this hatchery.

During the months of October and November, I received one thousand five hundred and thirty-one yellow perch from Erie, which were placed in the pond for breeding.

The improvements made on the hatchery grounds during the year are as follows: the outlet or splash at the upper dam has been widened to the depth of ten feet; the yellow perch pond was finished; built an ice-house measuring 20x20 and 10 feet to the square; placed a partition in the ice-house in order to make use of one part for storing tools, and shipping cans; built a meat house 12x15 feet, part of this building will be used for storing bass nests; painted the roofs of the hatchery and ice-house; changed the course of the creek to the left of the bridge at the entrance of the grounds; graded the ground around the ponds and planted trees at different places; put gravel on several driveways; cleared away underbrush, logs and stumps from different parts of the grounds; built five new ponds, and reconstructed two others; also began work on another large pond.

Since the first day of June the work has been done by four men including myself. The dwelling house has been nicely improved during the past year by having the hot water heating system in-

stalled, and a partition in the kitchen was removed, making that room more convenient.

During the hatching of the white fish, wall-eyed pike, yellow perch and pickerel at the Erie hatchery, in the months of April and May, I sent Philip Brown and Mark Janes to assist Mr. Hartman with the work. Mr. Janes and myself were also sent to Port Allegheny during the month of November to collect brook trout eggs at the Cold Spring Brook Trout Company's hatchery. We gathered 188,000 eggs, which were sent to the Spruce Creek hatchery.

During the year I have made frequent visits to the Erie hatchery and found work progressing nicely at that place.

I trust this report will meet with your approval.

Respectfully,

A. G. BULLER,
Superintendent.

FISH, ETC., DISTRIBUTED FROM DECEMBER 1, 1906, TO MARCH 30TH,
1907.

Lake Trout.

Planted in Lake Erie, advanced fry, 1,408,000

Large Mouth Black Bass.

Philadelphia county, adults, 123

Yellow Perch.

Armstrong county, fingerling, 350
Clarion county, fingerling, 675
Jefferson county, fingerling, 350

Total, 1,375

Calico Bass, Fingerlings.

Armstrong county, 890
Crawford county, 1,300
Erie county, 3,000
Jefferson county, 1,600
Philadelphia county, 500
Planted in Lake Erie, 8,000

Total, 15,200

Blue Gill and Long Ear Sunfish, Fingerlings.

Armstrong county, 4,000
Crawford county, 7,000
Erie county, 11,000
Jefferson county, 12,800
Planted in Lake Erie, 35,000

Total, 69,800

Small Mouth Black Bass, Fingerling No. 1.

Crawford county,	500
Erie county,	3,000
Venango county,	9,000
Warren county,	7,500
Total,	20,000

Small Mouth Black Bass, Fingerling No. 2.

Allegheny county,	500
Crawford county,	500
Erie county,	1,500
Total,	2,500

Small Mouth Black Bass, Advanced Fry.

Planted in Presque Isle Bay, 50,000

Small Mouth Black Bass, Fingerling No. 3.

Erie county,	150
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Tad-poles.

Clinton county,	6,000
McKean county,	6,000
Total,	12,000

Summary.

Lake Trout, advanced fry,	1,408,000
Large Mouth Black Bass, adults,	123
Yellow Perch, fingerlings,	1,375
Calico Bass, fingerlings,	15,200
Blue Gill and Long Ear Sunfish, fingerlings,	69,800
Small Mouth Black Bass, advanced fry,	50,000
Small Mouth Black Bass, fingerlings No. 1,	20,000
Small Mouth Black Bass, fingerlings No. 2,	2,500
Small Mouth Black Bass, fingerlings No. 3,	150
Tad-poles,	12,000

Total, 1,579,148

CRAWFORD HATCHERY, STATION NO. 7.

Report of W. H. Safford, Superintendent.

Hon. W. E. Meehan, Commissioner of Fisheries, Harrisburg, Pa.:

Sir: I beg to submit the following report for the year beginning December 1st, 1906, and ending November 30, 1907, of the operations at the Crawford hatchery. I desire first to give you a general report concerning all the work done, after which I will divide it into articles.

Up to the beginning of the year the progress of the work had been very slow. This was owing to the limited amount of money available for labor and supplies. With the opening of the spring of 1907 work in earnest on the station was started. Pond No. 2 that is being used for sunfish propagation was completed. This was started the fall before with but little headway made. The dimensions of this pond are 60 by 225 feet.

Pond No. 3 was then at once started. This pond will eventually be used for bass culture. For the present, however, it is being used for yellow perch. This is the finest pond we have on the reservation up to date. The dimensions are 85 by 225 feet, and give us a fine area for bass culture. The depth ranges from two feet at the upper end to four feet at Kettle hole.

I next turned my attention to the construction of fry ponds. One 25x80 feet was entirely completed. Another one 75x160 feet was about two-thirds done when other work took our attention and forced me to leave it over until next year.

The station in general has undergone a transformation. With the liberal appropriation granted by the last Legislature on your recommendation, I am able to make you a report that gives me a great deal of satisfaction.

In looking over the original ground for a site for the dwelling house, no particular place seemed desirable. On your visit to the station in the early spring this was called to your attention. A piece of ground adjoining us on the west, containing three acres was selected by you as a most desirable place to build. Acting under your instructions, I purchased the three acres on which to locate house and barn. The purchase of this land was made possible by the fact that there was a sum of money left in the hands of the Committee of Public Subscription. This was subscribed by citizens of Crawford county at the time of the location of the hatchery, and was not all used.

Building operations were at once started after you yourself had given minute attention to designs, the making of specifications and the placing of contracts, and a frame dwelling house, a barn and hatching house were completed.

Driveways and walks for the entire grounds will be started in the early part of next year. This will give you a general idea of

the amount accomplished this year aside from the great amount of water mains and other work which I will speak of later. I will now pass into details, starting in with the fish cultural work.

SMALL MOUTH BASS.

Bass culture still being in its infancy, the different ideas of fish culturists throughout the country are many. The environments not being exactly the same, no two places can be compared in any way or manner. The construction of ponds is varied as is the number of fish to each pond and in fact every fish culturist has his own ideas in regards to this work.

Bass ponds as built at Crawford hatchery would be called flat iron shape. The upper end, which has the inflow pipe, is square across with the corners rounded. The lower end at the overflow is given a long round point which, to my idea, gives a better circulation of water than those that are square. The depth of the water is uniform over the entire pond, with the exception of a triangular hole running from the overflow back into the pond between 30 and 40 feet. This ranges in width from four feet wide at the mouth of the overflow to thirty-five feet wide at the upper end of the pond. This hole is built for hibernating purposes alone. The depth of water carried during the spawning season in the spawning area of pond is about 2 feet. The depth of water at the hole is five feet.

The ponds were given a thorough test last winter as to their holding capacity. The weather conditions here during the winter are quite severe, the thermometer often registering as low as 35 degrees below zero. I carried forty-nine bass through in this depth of water without the loss of a single one. This proves to my satisfaction that five feet of water is ample to carry adult bass through during all seasons of the year. This pond is 75x225, containing 16,875 square feet.

The next problem was to find out how many pairs of adult fish it would hold. I placed sixty females and forty-nine males in this pond and at one time there were thirty-nine nests cleaned up and the majority of them with eggs on. I saw no evidence of fighting or overcrowding in any way and it is my intention to try a still larger number next year.

The natural aquatic productions at this station are abundant. The water plant known as Chara moss is especially plentiful and is absolutely alive with daphnia. This I found a most valuable help, of which I will speak later.

The type of nests used by the fish were both natural and artificial. I found one as successful as the other under certain conditions. Thus, when one natural nest was occupied the next one, an artificial one, might be empty and vice-versa. Of course I do not mean by this that the natural nest is in any way superior to the artificial one, as the artificial nest is an absolute necessity to provide secrecy to the fish then confined in the ponds of small area.

I will say, however, if I had a pond large enough and under my control, I would use nothing but natural nests, that is, what I call natural nests. I would provide shelter but not with a box formation. I noticed in particular the eggs in the natural nests were



CRAWFORD HATCHERY—Pond Showing Bass Nests.

invariable larger in number than those in the artificial nests. My reasons for this is, the larger fish requiring more room, would select the natural nests in preference to the artificial ones. Then again I think in the actual spawning the fish becomes tired of the confinement in the boxes and before the eggs are all cast, the female sometimes leaves, and with the few eggs deposited the male is well enough satisfied to proceed to work. However, I do not say this positively, but I intend to watch it closely again next year to see if it proves the same.

The types of artificial nests used at this station is known as the Lydell nest. It is two feet square every way with two sides enclosed. On the open or front side a three inch strip is nailed at the bottom. An excavation is made in the pond the depth of this strip and this filled with gravel from the size of a marble up to as large as a goose egg. You will invariably find the smaller stones rolled to the outside and the larger ones in the centre. This applies to the natural nests as well.

The form of screen or crib I used is circular and large enough to set down over the nests. They are built of heavy band iron frame with rim at the top and bottom and four standards to make it firm. These are made to a height suitable to the depth of water in which they are to be used and should be at least two feet above the surface. The outside is covered with the best grade of cheese cloth, and when they are set in the pond should be placed firmly and as nearly level as possible. In order to protect them from the action of wind and storm and even from attacks by the angry parent, a board was placed across the top and a stone or weight large enough to hold them upright placed on it. These screens proved very successful in confining the fry.

The past year in this section was very poor for bass culture. My bass began spawning on June 2d with the water at 66 degrees. June 11th I had nineteen nests with eggs and some with fry about ten hours old. That night we had a very heavy frost and the water dropped from 63 degrees to 42 degrees. The next morning the entire lot both eggs and fry were dead. This caused us a loss of not less than 100,000 fish. This was a serious blow coming as it did the first year of the station's work with the prospects so good.

I tried to prevent complete disaster by every means at my command, such as shutting off the inflow of water, but it was to no avail, the loss was complete. The weather was never known to be so cold in this section at that time of the year before, and I most sincerely hope it will never occur again. This kind of weather continued nearly the entire month. When the weather moderated, additional breeders arrived and spawned. The stock fish all came from Lake Erie and finer specimens I never saw. The fry from these fish were healthy and strong.

When it came time to remove the fry from nest to fry pond, I tried the experiment of feeding them while holding them in the cribs or screens on the nest. I held three nests and as soon as they began raising to the surface I suspended by a string, a bunch of Chara moss taken from the large pond. I noticed the little fellows began feeding at once. This moss was alive with minute water animal food.

I held them in this manner for ten days and they were as fat as could be. I compared them with those in the fry pond and found them almost a third larger. I intend trying this out more fully next year.

Before I transferred the fry from the spawning pond to the fry pond I had supplied it well with water plants. This pond, as I stated before is 25x80, with a depth of water ranging from eighteen inches to two feet. As fast as the fry rose to the surface on the nest in screens they were carefully transferred to this pond. I had about 40,000. This being the only fry pond completed at this time I was forced to place all my fish therein. Knowing well their canabalistic nature I knew they must have a great deal of attention.

I began feeding them ground liver twice a day. They seemed to take it very well, but owing to my inability to secure liver to the amount required I was forced to change to something else. I took crackers and rolled them very fine and began feeding with it. From the time I could get to watch them to my idea it was more preferable than liver. As far as cleanliness is concerned it was far superior because what the fish do not eat floats to the overflow and can be removed very easily.

The first fifteen days the fry were fed twice a day, after this, once. From the 40,000 fry placed in the pond I was able to ship 32,350 fingerlings from one and one-half to two and one-half inches long. Judging from the amount shipped I think canabalism was kept to a minimum.

On July 8th I began shipping and continued until the applications were all filled. Through your orders the surplus bass was planted in the Conneaut Lake, one of the finest natural homes ever created for this species of fish.

In closing my report on the bass work, I wish to reassert that the natural conditions for bass propagation at this station are ideal. The quality of the water is the best and with an unlimited supply. The condition of the ground is such that the building ponds we have found clay bottoms each time. This insures a bottom from which there would be very little seepage. This makes it easy to hold water at any depth desired and to close off the supply at any time to meet conditions. This is very essential at times. It also makes it easier to control the nestings of the fish which is also a great help. I predict a most successful future for this station in bass culture.

SUN FISH.

My experience with sunfish is limited. Yet I am very proud of the number of fingerlings I produced last year. Being aware that their characteristics are very similar to the bass, after a conference with you I constructed my pond on the same lines I would for bass. The pond is 60x225 feet and proved very successful. From 245 adult fish (the sexes undetermined) I shipped and planted 93,000 fingerlings. It being the first year the fish spawned in the ponds I consider the output remarkable.

As the spawning period approached, I prepared the pond with gravel nests (natural), set them about the same distance apart as I would for bass, which was about fifteen feet. I soon found these

little fellows were not so particular in selecting their beds as the bass. I found nests on the gravel, on the clay and in fact all over the entire pond with the exception of the kettle hole. I found also that they differed in one or two other respects. One was their docile nature toward one another. I had nests as close to each other as eighteen inches and to all appearances the two neighbors were as friendly as possible.

Another remarkable thing I noticed was that each and every nest, whether built on gravel or clay had eggs and each and every one produced fry. I found no nest where work had been started at all, but was finished entirely to the hatching of the fry. Sunfish are very prolific and I found some very large nests. Nest building by the fish is the same as with the small mouth bass with the exception of the depth they will excavate. They will go down as low as from four to six inches. Those that used the gravel nests did not seem to be so particular in regard to size of stone to spawn on. They usually cleaned up the whole pile of gravel which varied in size from two and a half to four and a half feet across. When the nest was built on the clay bottom the excavation would be nearly round, and as I said before from four to six inches deep, and not more than from fourteen to sixteen inches in diameter.

You cannot expect a sunfish to spawn where you want it to; they are like some people will do as they want to anyway.

The habits of the fry are about the same as the small mouth bass, rising to the surface anywhere from the third to the fifth day, according to the temperature of the water and ready to scatter and take care of themselves.

The manner of cribbing was the same as in bass. In fact I used the same cribs as I did for my bass.

Not having fry ponds sufficient in number, the rearing of sunfish was altogether different than that of the bass. It showed me the advisability of large fry ponds. Instead of removing the fry from the spawning pond I removed the adults. I had a pond partly completed to which I transferred all the adult fish, leaving the fry in the large spawning pond that they were hatched in. They had nothing but the natural food having no attention in the way of feeding at all. From the number shipped and planted the condition and size of the fish makes it certain to my mind that large fry ponds cannot help but be successful. This applies either to bass or sunfish. The natural conditions at this station for the successful propagation of this species of fish are good. I see no reason why we should not double our output next year. Every application on file at this station was filled and in compliance with your instructions the surplus fish was placed in Conneaut Lake.

FROGS.

In order to keep pace with the older hatcheries under your supervision, the first two ponds constructed this spring were for frog culture.

The uncertainty attached to the propagation of frogs is astonishing. The impression naturally prevails to those who are unacquainted with this work that it would be the easiest thing in

the world to raise frogs. But how easy it is to be mistaken. In my opinion there is nothing pertaining to fish culture as uncertain as frogs. It will seem as though you are going to have the very best results, then in a few days your hopes will be shattered as there will be nothing but water in the pond.

Ponds that I had previously constructed at Torresdale before I was assigned to Crawford had proved unsatisfactory to me. The results were poor and I concluded they were too shallow. The two ponds I have here have a depth of twenty inches of water. In the early part of April I received 400,000 eggs from Erie station. By the number of tadpoles I had, in my judgment, 95 per cent of the eggs hatched.

Mindful of the trouble I had at Torresdale station with the larvae of the dytiscus or water beetle, I was in a quandary as to what I should start feeding with. The depth of water as I said being twenty inches I concluded to try fish again. I was able to catch a few large carp. These I dressed, throwing the offal away. I then placed them in the pond weighted down to keep them under water away from the sun. These proved very acceptable to the tadpoles.

As time ran on I was not able to get fish enough. As the tadpoles grew their appetites accompanied them. I then tried stale bread, which was not much of a success. I could not see that they fed on it at all. Then I turned to liver which they took as well as fish.

During all this period of fifty days, I don't believe I had any loss to speak of, but a change began to take place. This was just before the hind legs began to break through. I first noticed they were not feeding, then a few dead ones began to appear around the edge of the pond. I started to investigate. I made a thorough examination of the ponds and found nothing injurious to them in the shape of snakes or larger frogs. This was the upper pond where the mortality was the greatest. I did find water beetles and its larvae however in the lower pond. I succeeded in removing them before they did any damage. Both ponds were clean and wholesome. Of this one fact I am assured foulness had nothing to do with it.

On examining the tadpoles carefully, I found they were affected in different ways. Some would have red blotches on various parts of their body. Others would be badly bloated, some with one leg broken through. Again I found them with all four legs, a fully developed frog, without any apparent mark on them. I had no idea what the disease was and will truthfully say I did not know what to do for them. I changed the flow of water on them several times. I would increase the water and then close it off with no apparent effect.

All this time the loss was enormous. I only succeeded in raising 37,000. In conferring with the other superintendents at the other stations I find, however, this is very good.

In going over the conditions as we find them I believe the natural mortality of frogs is very heavy. In traveling over the country in the spring time, we see every pool alive with tadpoles. But you may go back over the same ground in midsummer when they have had time to develop into frogs and we fail to find any great number. For a man to start out to gather 1,000 adult frogs, he has picked

out quite a task. You see them jumping in here and there along a stream and you imagine there are thousands of them, but when you have captured all you have seen you will find the amount very far from your original idea. And my proof is this, during the time my tad-poles in the ponds were affected I made several trips into the country to examine the tad-poles I found in the springs and streams. I found them affected in the very same manner as mine, with the same red blotch. The conditions were practically the same. Frog culture is a very deep and open question, and when the time comes that we can get them through this precarious stage the question will be solved. Then we will be able to raise them in large numbers.

DESCRIPTIONS OF NEW BUILDINGS.

We have a set of buildings at the Crawford hatchery that is a credit to the Commonwealth.

First, the house which is two stories high and is modern and up-to-date, being equipped with steam heat. It contains nine rooms, including bath. This house was built under my direct supervision and I wish to say was erected directly according to your plans and specifications. Its dimensions are 26x28, with large porch extending entirely across the front. It also has a porch at the back. It has a slate roof and makes a very nice appearance.

BARN.

The barn is arranged to fill a two-fold purpose. First, the main part is given up to stalls for horses on one side and storage room for wagons on the other. The upper floor is used for storing hay and straw. The lower floor of the wing is used as a carpenter shop, which is very essential to every station. There is more or less carpenter work all the time. This is also used as a paint room. The upper floor is given up entirely to the storage of the fish culture equipment, such as cans, nets, bass screens, etc. Take it altogether it is a building I appreciate very much.

HATCHING HOUSE.

Your selection of the site for the hatching house was very wise. In the first place it permitted us to erect one of the largest single batteries I know of in the country. Then again the operating expense aside from the labor is practically nothing. Battery stations as a rule are very expensive, depending usually on a pumping or waterworks system. This makes a constant expense. The topography of the ground here gives us a natural fall of water of fourteen feet. This affords plenty of pressure to raise the water which is necessary to battery work. The building is 32x60 feet with an excavation of two feet, or a total height from floor to girders 10 feet and 7 inches. The roof is supported by four double trusses, reinforced by iron rods. The floor is of cement with a drainage sewer running entirely around outside next to wall.

The water is brought in at the center of the building at the upper end, and elevated 14 feet into large supply tank. This tank was built to supply all three batteries when completed. Your intention

was to give us three batteries, but at present only one is in operation.

The battery is eight troughs high, each 28 feet long, 14 inches wide and 12 inches deep. They are divided into four sections and equipped with 340 Meehan hatching jars. The capacity of this battery is very gratifying. It will increase the output of the station greatly, and can only add one more mark to your credit as Commissioner of Fisheries. With this gravity water supply it makes one of the finest batteries in existence.

SPRINGS.

With your usual foresight in locating a new station the water rights on the adjoining land was secured at the time the original grounds were purchased. It has proved invaluable to this station. It permitted us to select our own site for the hatchery. It also did away with the expense of boring for a well to furnish water for dwelling house and barn. With very little labor I was able to develop several good springs being at a good altitude gives us a fine fall of water. I constructed a dam fifty feet inside of the public highway for a headwater for the hatchery. From this dam to the site of the hatchery a distance of 1,450 feet, a four-inch water main was laid.

The dam is located on a small spring run and this, together with the springs developed, gives us a very good supply. I selected one of these springs for a water supply for the house, and under your instructions installed a small hydraulic ram. I then laid a half inch pipe from spring to house and barn, a distance of 2,400 feet. By this we have running spring water in both house and barn. This is a convenience not many have.

It is naturally the ambition of every superintendent under your control to produce as great an output of fish as possible. I have this ambition in common with the other superintendents. Crawford hatchery is at present a station for battery and pond culture work only. I would naturally like to see trough work introduced. There are no large springs either on the property or other property in the immediate neighborhood which are under the control of the Department. The springs belonging to the Department on the surrounding lands are small and needed to swell the water supply of the stream furnishing water for the battery. But there is a spring a little more than half mile from the hatchery, the water of which would more than fill a six inch pipe and is admirably adapted for trout work. If the Department does not care to go to the expense of purchasing the water rights of this spring and piping it to the hatchery modified trout work could be done in a different manner. A trout hatching house of any size desired could be built on the grounds and the water from Conneaut Lake outlet utilized for the hatching of trout eggs. Also care of fry and advanced fry and even fingerlings, up to May 1st. As it is the policy of the Department to distribute its trout to applicants as early as possible and at the latest shortly after the first week in May, surplus trout eggs could be brought from other stations hatched, handled and distributed in the manner described and within the time given.

Of course no fish could be retained at this station for breeding and eggs would have to come from outside. I make this sugges-



CRAWFORD HATCHERY—Interior Showing Jars Containing White Fish Eggs.

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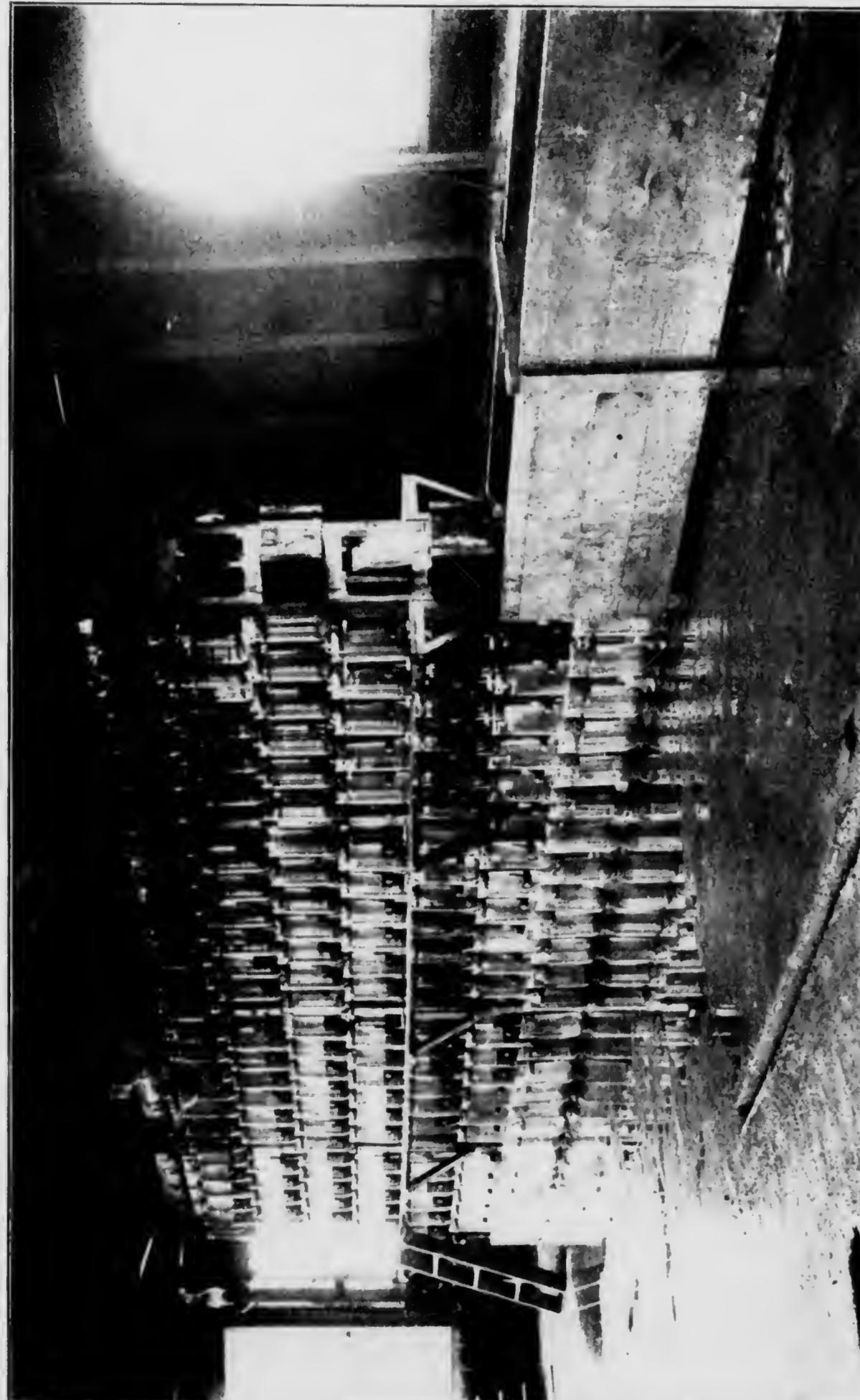
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tion because I know it is your policy to maintain at the various trout stations as soon as possible stock which will yield eggs as far in excess of the capacity of those hatcheries to hatch and handle.

CONNEAUT LAKE.

Conneaut Lake is the largest inland lake in Pennsylvania, four miles in length with an average of a mile in width and very deep. It has an abundance of good clear water. It is the natural home for black bass, sunfish, yellow perch, lake trout and in fact all species of fish that are the pride of the angler. It also includes the Chataqua Lake muscallonge of which I wish to give special mention. This fish is becoming very plentiful. The number taken in the past year has exceeded that of any other year. This is due beyond a doubt to the planting of fry by the Department in previous years. Some of the finest specimens I ever saw were caught last year. It was not uncommon to see them from twenty to thirty-five pounds.

Your wish to propagate this fish in large numbers makes the Lake of double value to the Department. The lake being one-half a mile from the hatchery gives us every advantage, not only in furnishing a place to plant all surplus fish, but it allows us to watch the direct result of artificial propagation. We have been under some disadvantage in gathering muscallonge eggs, depending principally on Lake Chataqua to furnish them. It has been your aim to produce this fish in some of our own lakes in large enough numbers to warrant the setting of nets for the purpose of taking our own eggs.

In Conneaut Lake I think the result has been reached and I would suggest in the near future the experiment be tried. The pound nets I think would be best. The shore conditions of the lake make it almost impossible to use haul seines, still they might be used. The question of their propagation is an important one not only to the Department but to the people at large. Many of the lakes found in the borders of Pennsylvania furnish any amount of room for their maintenance. The size, gameness and edible qualities, also its readiness to take the hook make it a very desirable fish.

EXPERIMENTS WITH SULPHATE OF COPPER.

In accordance with the orders from you, I made a series of experiments with sulphate of copper, to ascertain how much certain fish could stand before dying, so that it might be determined how much could be safely used, when using the poison to destroy algae which gathers in great quantities in the ponds in some of the hatcheries.

Fifty sunfish fingerling size were placed in a bucket of water with one heaping teaspoon of the sulphate of copper. These were left fifteen minutes. They showed no signs of uneasiness at the end of that period and were then returned to the retaining trough in clear water. The next morning 50 per cent. were dead.

On the third day I tried the experiment again with two teaspoons of the sulphate of copper, leaving them eight minutes. The next morning they were all dead but three.

Ten fingerling small mouth bass were tried the same way. On the first trial they showed great uneasiness in one minute and forty seconds, and four were dead the next day and the third day I tried them with the double dose left them in one minute and the rest died. Either amount I think would not affect fish in the ponds but I will make further experiments later.

MISCELLANEOUS.

The large dam that is used to create a water supply for our ponds has proven a source of lots of trouble to me. The amount of water that it has to resist at various times is astonishing. Not only the entire overflow of the large lake but the drainage for miles around is brought down, over, and through this dam.

Being a stranger to this section of the country at the time of my assignment to this station, I was unaware of this fact. Had I known of these conditions I would have built the dam on different lines. I think though that at last I have it secure. I reinforced the upper side with a double wing and in the centre a false front so that the water in coming down will either pass through the opening or up over the top, making it almost impossible to undermine it. On the lower side I built two protecting wings, thirty feet long, running at an angle into each bank. This prevented cutting by the under currents. Since this last overhauling it has stood all the heavy storms without any apparent injury.

Not the least important of our work has been the building of a sluice way leading to our main ponds. Heretofore, we depended on an open ditch leading to the yellow perch pond, a distance of 285 feet. This was unsatisfactory, filling up with weeds and other things. The sluice way is built of one and a half inch oak plank, and is 18 inches wide and 18 inches deep, running straight across upped end of all three large ponds with connections for each.

In order to take care of the surplus surface water, a six inch drain has been laid from upper end of ground to the lower end of bass pond, where it empties into the sluice way. A high embankment has been thrown up along the outlet to prevent water running on adjoining land. This is not as yet all done but will be finished as soon as possible.

The working equipment has been greatly added to in the shape of a second horse, heavy team harness and wagon.

Acting under your orders, I attended the meeting of the American Fishery Society, held at Erie, July 22d to 25th. It was the most enthusiastic and beneficial meeting I ever attended. These meetings are more than important as it brings together men of the highest ability connected with fish culture. The discussion of the different questions and perplexities result always in giving new views and ideas. Your order compelling all superintendents to attend these meetings is wise and there can only be one result of this and that is the increasing of the efficiency of the Department.

A request came from the city officials of Meadville for permission to catch fish of different species for the public fountain of the city. This was referred to your office and permit was granted by you. The large net belonging to the station was loaned for this purpose.

The fishing was done under the direct supervision of Mayor Reitz and City Clerk Robinson, and was done strictly as permit allowed.

The request of Crawford County Fair Association for an exhibit by the Department of the different species of fish at the annual fair could not be granted. There was no money available for this purpose. In my opinion this is a matter that should have some attention. It is very important that the people of the State be better informed on this question that they might be shown the advantages of artificial propagation and protection.

RECOMMENDATIONS.

First that the sum of \$6,000 be appropriated for the purpose of building and extending pond culture work at this station. That at least three new bass ponds, one catfish pond and two or more fry ponds are necessary. To build and complete driveways, gravel walks to continue and extend draining grounds. I also recommend the building of an ice-house of suitable size. The shipping of fish in their various conditions makes this a very necessary building. Also that a sum of money be set aside for the purpose of making exhibits of the different way of propagating the different species of fish that are indigenous to the waters of our State. No money can be expended more wisely than in this manner. The following is a tabulated statement of the different species hatched and the counties they were planted in and the number to each county. All of which is respectfully submitted.

Your obedient servant,

W. H. SAFFORD.

DISTRIBUTION OF FISH, ETC., FOR YEAR 1907.

Fingerling Bass.

Beaver county,	750
Jefferson county,	1,500
Lawrence county,	750
Armstrong county,	1,500
Mercer county,	2,000
Warren county,	750
Butler county,	2,750
Crawford county,	22,350
Total,	32,350

Fingerling Sunfish.

Allegheny county,	11,000
Beaver county,	2,000
Mercer county,	11,000
Lawrence county,	2,000
Washington county,	1,000
Crawford county,	66,000
Total,	93,000

Frogs.

Armstrong county,	2,400
Clarion county,	1,200
Warren county,	5,500
Forest county,	1,500
Crawford county,	26,400
Total,	37,000

Yellow Catfish Fingerling.

Crawford county,	400
	400

Water Plants.

Crawford county,	300
	300

Summary.

Bass, small mouth,	32,350
Sunfish, fingerlings,	92,000
Frogs,	37,000
Catfish,	400
Water Plants,	300
Total,	163,050

W. H. SAFFORD,
Superintendent.

SPRUCE CREEK HATCHERY, STATION NO. 8.

Report of Wm. F. Haas, Supt.

Spruce Creek, Pa., December 6, 1907.

Hon. W. E. Meehan, Commissioner of Fisheries, Harrisburg, Pa.:

Sir: Please find report of work done at the Spruce Creek Hatchery, from December 1, 1906, to December 1, 1907.

On the first of December, 1906, there were six permanent and three temporary trout ponds, one pond containing about 250 mature wild trout and the others with yearling brook trout and lake trout. There was also one bass pond, one catfish pond and two bass fry ponds not quite finished. The bass pond contained 55 mature small mouth bass and the catfish pond a number of white and yellow catfish and sunfish. There was also a temporary hatching house, little more than a covered shed, containing 10 double troughs.

On the last day of November, 1907, there were 10 permanent trout ponds and three temporary trout ponds. One of the bass fry ponds was completed and a lake trout pond 30 feet wide and 39 feet long was nearly completed. The permanent trout ponds are 18 by 30 feet each, having a depth of three feet of water. During the summer a permanent hatching house was built. It is 100 feet long, 40 feet wide, 8 feet to the eaves with a gambel roof supported by single railroad trusses. It contains 60 double troughs or 120 single troughs. They are arranged the same as the hatching house at Union City, that is to say in three tiers so that the same water is used three times before it flows from the house. By this system only one-third of the water is used compared with the old method of hatching house construction. The floor is concreted. The house is set 200 feet below the spring and the water is carried through a ten inch terra cotta pipe to the north end of the west side of the building.

The foundation walls of the house are of terra cotta blocks glazed, sixteen inches long, eight inches wide and eight inches thick. The full height of these walls are about four and a half feet. The remainder of the building is frame. There are thirty-two windows and a door at each end. There are two ventilators in the roof to carry off the vapor rising from the water in winter and keep the house dry. A ditch runs the length of the east side of the house and to carry off the waste water from the troughs. The supply trough is on the west side and is sixteen inches deep and fourteen inches wide.

This trough is much larger than is needed to carry water for the troughs, but was made this size so that the surplus water in the winter and all the water from the ten inch pipe in the summer could be carried from the house at the south end into a series of

trout ponds to be built in the future. The cost of the house, including the troughs was about \$2,000, probably the cheapest hatching house ever built in any of the State hatcheries when the price of lumber is considered. It was built entirely by the force on the hatchery. The Commissioner and myself ordered all the material and the Department's carpenter and the men on the hatchery put the building up.

The most expensive part of the house was the troughs. These had to be of the very finest cypress, which cost \$90 a thousand. It required about 3,500 feet. Each double trough is 12 feet long, eight inches deep and forty inches wide, making each single trough 18 $\frac{1}{2}$ inches inside measurement. They hold five hatching trays, each with a capacity of 20,000 brook trout eggs without crowding, thus giving a capacity of at least 4,000,000 fish, and with the character of the water I find that 5,000,000 could be safely carried with close attention given them.

Early in March, the melting snows and a heavy rain storm caused a rise in Spruce Creek and the upper part of the grounds was flooded and the water came within a foot of flowing into the ponds. The troughs in the temporary hatching house floated and there was about two feet of water in the house. I am glad to say, however, that the flood was chiefly caused, not by a general overflow of the banks, but by two or three depressions, and had they not been there there would have been scarcely any water in the lot. Therefore it would be a very easy matter to prevent floods in future, when we have time to run a low dyke along the banks of the creek.

When I took charge of the hatchery there was no dwelling house on the grounds nor a barn and I was forced to live in the village and rent a space in a neighbor's barn for the horse and wagon. In April the Commissioner purchased two houses and a barn and about an acre of ground at the upper end of the hatchery, so that before the first of May I was enabled to move into one of the dwelling houses and thus be able to exercise better control over the hatchery. The other house was occupied by one of the men.

I am sorry to say that this man subsequently exercised a bad influence over the other men on the place culminating in the summer in their all stopping work but one man. I notified the office and within twenty-four hours replaced them with other and better men. I likewise refused to take any of the men back, with one exception, a young man whom I believe was mislead rather than being a ring leader, and I am glad to say that since I took him back, he is doing very well, although I only took him back as a laborer.

As stated in my last annual report, one of the first pieces of work I undertook was the building up of the spring. This I raised to a height of 32 inches, and I had a flow of water which I estimated to be about 1,000 gallons a minute. The water held up well. Some time in December, one morning I found that the volume of water in the spring had quite doubled, but to my surprise was not the least bit muddy, showing that it was not surface water. It held this way for about two weeks when there was again a sudden increase by pretty nearly another thousand gallons a minute, so that there was flowing from the spring very nearly 3,000 gallons of water a minute. I was therefore forced to open one side of the spring

and dig a ditch to the creek and allow about two-thirds of the water to flow away. Before I could get this completed, however, the volume of water flowing through the ponds was so great that I lost more than half the fingerling trout. A week or two after, that is to say about the middle of June, the water in the spring became a little cloudy, showing apparently surface water. This cleared away in a few hours, but it was followed by a minute slimy substance that looked very much like grease and it had a greasy feeling. I reported the matter to the office at once and you sent Superintendent William Buller and Nathan R. Buller to examine it, but they had never seen anything like it and could not tell what it was. I sent you samples and you reported that it was a subterranean algae. This material kept flowing through the spring for very nearly two months. It got into the gills of the advanced fry and killed all but 80,000. This algae disappeared as suddenly as it came. One day there was quite a lot of it in the spring and the next day there was no trace of it and there has never been any since.

Later in the spring the volume of water decreased until it fell to about 1,500 gallons a minute at which point it has held steadily ever since. My opinion is that by building the spring up, we backed the water into the hill and thus opened up another spring. Because of the increase in the volume, I felt that the size of the spring had better be increased and also raised a little more. I therefore made it nearly a third larger in area and built the sides of the spring sixteen inches higher, so that if an increased volume of water would come there would be room for it. I also made the overflow outlet permanent, and this fall I started the lake trout pond which I mentioned, to the west of the spring, so that the waste water could flow through and be utilized. Instead of flowing all of the water out of the west end, by your direction, I will this winter begin the construction of a series of trout ponds to the south of the lake trout pond and parallel with the ponds already built. I find the water there good for hatching fish, although a little too speedy, as the period of hatching for trout is between 35 and 40 days, but notwithstanding this, they appeared to be fine, healthy fish and not weak, as generally come from such early hatching. I had a few eggs from my own fish and about 400,000 from Blooming Grove, but the eggs were not very good and most of them died. They were taken too late. About 500,000 eggs were shipped from the Wayne hatchery. These were eyed eggs and the little fish which hatched did well until the appearance of the algae.

When spring opened I built a frog pond, which in time was stocked with eggs, some of which I gathered and some were sent me from Torresdale. These eggs hatched, but before the tadpoles turned into frogs they were attacked by a very minute water creature which looked something like lice, but which I was informed afterwards was the full developed daphne, which is very abundant in our water. These little creatures attack the tadpoles so heavily that nearly all died so that my frog work was a failure.

Early in the fall I received a box containing about fifty fine specimens of live pearl mussels from Massachusetts of the species known as *Margaratina Margaratifera*. This is the well known fresh water

pearl mussel of the cold water trout streams of the north and is chiefly valuable for the pearls which it contains.

About the eighth or tenth of November, I received a second box containing a number of live mussels from Yellow River, Marshall county, Indiana. This is the famous fresh water pearl shell mussel of the Mississippi valley which is used for making pearl buttons and also occasionally contain pearls. It is supposed to thrive in water like that of the Juniata and Susquehanna rivers. I planted them in two of our ponds in the deep water where the bottom was muddy and both species ought to survive our winter.

I also received two large specimens of red legged terrapin which I put in the frog pond. With these came instructions from you that next spring I was to begin the propagation of these turtles.

The bass in the pond survived the winter well. I did not lose a single fish. Early in the spring I received an additional 48 from Erie and shortly after they began cleaning the nests in the upper end of the pond, but they had hardly done so when green algae began to form rapidly and drove them away. The fish seemed determined to spawn, however, and to my surprise made nests for themselves on the mud in the lower end of the pond and successfully hatched out over 20,000 fish. I only had one pond for fry and this number greatly overcrowded it and although the entire bottom was covered with chara moss and the chara moss was literally alive with daphne, the little bass began to eat each other and by the time orders for shipping came there were only 2,200 left. These were fine large healthy fish. I am satisfied that in order to insure success there must be several fry ponds with only a few fish in each or the bass must be shipped when they are about thirty days old. The bass began to spawn on the 28th of May, and one or two were still on the nests the last of June.

The sunfish began nesting about the middle of June, and although I had only a few mature fish, several thousand young fish were hatched. I lost quite a number through musk rats cutting holes through the bank, but I succeeded in shipping 4,000, filling my applications. I was unable to fill all my applications for bass and had to hold over about 35 for next year.

The first trout eggs were taken this year on October 24th, but what fish I had came very slow. Most of my wild trout proved worthless and all my two year olds, nearly 75 per cent. were males. consequently, on the first of December I only had about 120,000 eggs.

Two days before the first eggs were taken I was seized with a severe attack of bilious fever from which I was confined to the house for about three weeks. You sent Mr. Harry Griffith, an assistant at Bellefonte, to take charge while I was ill, and I cannot give him too high praise for the manner in which he did his work. He made friends at once with all the men and all gave him cheerful obedience. Mr. Griffith showed himself to be thoroughly capable, both as a fish culturist and to be in charge of men. On my recovery in the middle of November he returned to Bellefonte.

Among the many things which were done on the hatchery during the year was the building of a road from the upper end of the grounds on the east side through the woods to the new hatching

house. This, however, is not completed, work being done only in leisure moments. The grounds surrounding the permanent ponds was graded to the woods and down almost to the hatching house.

An addition was made to the barn 16 by 20 feet by our own men. The dwelling house was newly papered from top to bottom and painted. Also done without employing outside labor. The new hatching house was painted and a sign put up bearing the words, "Pennsylvania Department of Fisheries, Station No. 8."

During the summer I received about 15,000 No. 2 fingerling brook trout from the Wayne hatchery and these fish carried through the summer very well, and on the first of December they completely filled three of the ponds.

In my report of last year I drew attention to the finding of a spring on the right bank of Spruce Creek just below the wagon bridge, which-flows about a four inch pipe of water. In the spring of 1907, I found another about 100 feet below which is very nearly, if not as large. I have watched this as well as the first spring all through the summer and I find no variation in the flow. I still feel confident that these springs have a very rapid fall and if I am right they can both be built up to a height which will enable the water to be piped to the grounds and utilized for another series of trout ponds. There is another huge spring about 1,300 feet above the hatchery grounds and about 1,100 feet above the upper end of the State property. This spring is nearly as large as the main spring on the grounds and I believe the water can be easily obtained and carried down to the hatchery at a very small expense in a 10 inch pipe so that by the three springs we can have 50 or 60 fine trout ponds located from the hatching house to the creek, and I would recommend that these springs be utilized as soon as possible.

Building ponds on the Spruce Creek hatchery is a simple and inexpensive matter when compared with the other hatcheries. The ground is of a sandy loam free from stones to a depth of about three feet. An ordinary trout pond can easily be completed in a week including the lumber, sides and gravel. One of the difficult things to obtain hereabouts is gravel. I have used up nearly all the available gravel which could be found on the river bank and I am afraid we will be driven to use crushed stone. This I dislike to use, however, because of their sharp edges, but I see no help for it unless we find a bed of natural gravel somewhere here in the neighborhood.

We are very much bothered with musk rats—the place seems to be alive with them and it requires constant watchfulness to keep them from boring through the banks of the bass ponds. The meadow land composing the hatchery grounds is quite a resort for copper head snakes. Last summer we killed four in one week, two of which were killed within half hour of each other. In all more than a dozen were killed during the year.

The following is the approximate stock in the ponds on December first:

Black bass,	75
Mature sunfish,	30
Sunfish, long ear, fingerlings,	200

No. 21.	DEPARTMENT OF FISHERIES.	169
Catfish,	30	
Brook trout, three year olds and over (worthless), ..	75	
Brook trout, two year olds,	4,000	
Brook trout, yearlings,	5,000	
Lake trout, two year olds,	300	
Lake trout, yearlings,	3,000	
Brown trout, two year olds,	100	
Total,	12,810	

The report of the output of fish for the year is herewith appended.

Respectfully submitted,
WM. F. HAAS,
Superintendent.

OUTPUT OF FISH, ETC., FROM DECEMBER 1, 1906, TO NOVEMBER 30, 1907.

Brook Trout.

Bedford county,	41,000
Blair county,	7,000
Huntingdon county,	32,000
Total,	80,000

Sun Fish.

Bedford county,	1,200
Cambria county,	600
Centre county,	400
Indiana county,	1,800
Total,	4,000

Black Bass, Small Mouth.

Bedford county,	1,100
Blair county,	400
Dauphin county,	500
Fulton county,	200
Total,	2,200

Summary of Distribution.

Brook trout,	80,000
Sunfish,	4,000
Black Bass, Small Mouth,	2,200
Total,	86,200

PRIVATE AUXILIARY NO. 1.

Report of Bromley Wharton.

Philadelphia, January 15, 1908.

Hon. William E. Meehan, Commissioner of Fisheries, Harrisburg, Pa.:

Dear Sir: I beg to submit herewith my report of Auxiliary hatchery No. 1 for 1907.

As you know these are private ponds located on my place in Bucks county near Bristol.

Pond No. 1 was stocked in the summer of 1906 with Lake Erie sunfish and yellow perch. Young sunfish began to appear in August, 1906, and are now about two inches long.

In the summer of 1907 sunfish again spawned and there are now about one thousand young sunfish in the pond.

Yellow perch did not do so well, but I will have a few a couple of inches long in the spring.

I distributed some of the sunfish along the Neshaminy Creek. The remainder will be planted in the spring.

Pond No. 2 contains black bass which were placed there in the fall of 1905. These bass bred very rapidly and in the summer of 1906 I had several thousand young bass in the pond. In the fall of 1906 a big mouth bass from Torresdale hatchery was placed in pond No. 2. I could not see that the bass propagated last spring and my theory is that the big mouth bass ate all the little fish up. This is only a theory, however, and there may be other reasons why these fish did not propagate. As you know, we had a very late spring, practically no spring at all, going from winter into summer. However, I took the big mouth bass out last fall. I think the hatching of the fish in these ponds is a decided success and I hope to be able to turn several thousand fish into the Neshaminy this coming season.

I am, sir, with respect,

Very truly yours,
BROMLEY WHARTON.

REPORT OF THE CHIEF WARDEN.

To the Board of Fishery Commission:

Gentlemen: I have the honor to respectfully submit my second annual report, which embraces the fish protective work of the Department of Fisheries from December 1, 1906, to November 30, 1907.

It has been my endeavor to bring the warden service to the highest state of efficiency and the figures will show, at least, a very great improvement in the regular warden service. A large territory of my own and individual efforts to assist the regular and special wardens and get them in good working trim interferred somewhat with my office work so that several features, which I hope to have in operation in the office, were interfered with and necessarily postponed for a more favorable opportunity. The following tables will show the legal work of the Department in detail:

TABLE NO. 1.

Statement of Legal Proceedings.

The following is a tabulated statement of the legal proceedings taken during the year:

Total number of arrests from Dec. 1, 1906, to Dec. 1, 1907,	536
Total number of convictions from Dec. 1, 1906, to Dec. 1, 1907,	477
Total number of acquittals from Dec. 1, 1906, to Dec. 1, 1907,	59
Total number of committed to jail from Dec. 1, 1906, to Dec. 1, 1907,	22
Total number of fines imposed from Dec. 1, 1906, to Dec. 1, 1907,	\$14,805
Total number of fines served in prison from Dec. 1, 1906, to Dec. 1, 1907,	\$2,660
Total number of appealed cases unsettled from Dec. 1, 1906, to Dec. 1, 1907,	\$3,850
Total number of fines paid from Dec. 1, 1906, to Dec. 1, 1907,	\$8,295

TABLE NO. 2.

Work of each Warden and Officer.

The following tables exhibit the work of each warden in detail:

REGULAR WARDENS.

No.	Wardens.	Arrests	Convictions.	Acquittals.	Jail.	Fines imposed.	Fines paid.	Report of					
								Arrests.	Convictions.	Acquittals.	Jail.	Fines imposed.	Fines paid.
1	J. W. Criswell,	102	86	16	1	\$1,895	\$1,430						
2	C. H. Nesley,	50	46	4	3	1,155	585						
3	W. E. Shoemaker,	71	65	6	4	1,630	915						
4	C. R. Holland,	22	17	5	.....	390	293						
5	J. E. Conklin,	13	13	.....	1	775	235						
6	G. D. Shannon,	37	33	4	1	735	410						
7	J. P. Albert,	27	27	.....	1	695	620						
8	M. F. Albert,	30	26	4	.....	1,150	825						
9	M. P. Maltland,	46	39	7	1	890	870						
	Totals,	398	352	46	12	\$9,315	\$6,180						

SPECIAL WARDENS.

Report of	Arrests.	Convictions.	Acquittals.	Jail.	Fines imposed.	Fines paid.	Report of						
							Arrests.	Convictions.	Acquittals.	Jail.	Fines imposed.	Fines paid.	
Altman, J. D.,	1	1	.....	.....	\$30	\$30						
Allison, Thomas,	7	6	1	.....	65	65						
Alderman, J. B.,	1	1	.....	1	25	25						
Brown, Hiram,	1	1	.....	.....	25	25						
Broune, F. A.,	3	3	.....	.....	75	75						
Craig, H. L.,	3	2	1	.....	200	200						
Crittenden, T. C.,	8	8	.....	.....	200	100						
Davis, Jenkins,	2	2	.....	1	90	80						
Fehr, Geo. W.,	14	14	.....	.....	175	165						
Heffner, Carmy,	1	1	.....	.....	25	25						
Heckley, F. E.,	1	1	.....	.....	.....	.....			
Hover, Jos.,	9	8	1	.....	165	140						
Keller, Jacob H.,	1	1	.....	.....	20	20						
Kibe, Robert,	3	3	.....	.....	300	300						
McCauley, J. B.,	4	4	.....	2	250	50						
Marcey, Raymond,	29	29	.....	2	1,230	365						
McGarvey, P. F.,	3	3	.....	.....	.....	.....			
Nichols, Purley,	2	2	2	.....	.....	.....				
Riley, George,	2	2	.....	.....	75	75						
Schoendorfer, F.,	1	1	.....	1	100	.....						
Sclechitano, A.,	2	2	.....	.....	50	50						
Sherwood, J. L.,	1	1	.....	.....	25	25						
Tucker, R. S.,	1	1	.....	.....	10	10						
Wescott, M. J.,	1	1	.....	.....	20	20						
Whiteman, F. B.,	1	1	.....	.....	10	10						
Williams, J. L.,	9	9	.....	.....	170	10						
Wood, N. M.,	1	1	.....	.....	10	10						
	Totals,	112	103	9	7	\$3,335	\$1,860						

STATE POLICE, POLICE AND CONSTABLES.

	Arrests.	Convictions.	Acquittals.	Jail.	Fines imposed.	Fines paid.
State Police,	17	17	.....	2	\$1,705	\$110
Bretzler, W. E.,	3	1	3	1	285	.....
Richardson, Geo.,	1	1	.....	.....	25	25
Starkey, Harry G.,	1	1	.....	.....	40	40
Stanley, Wm.,	1	1	.....	.....	30	30
Stanley, J.,	1	1	.....	.....	50	50
Stephens, A. B.,	2	2	.....	.....	.....	.....
Totals,	26	23	3	3	\$2,135	\$255

TABLE NO. 3.

CasesAppealed.

Cases appealed to County Courts,	63
Cases disposed of in County Courts,	13
Cases sustained in County Courts,	12
Cases dismissed in County Courts,	1
Cases appealed to Superior Court,	9
Case disposed of by Superior Court,	8
Cases sustained by Superior Court,	8
Cases dismissed by Superior Court,	8

TABLE NO. 4.

Different Charges.

Dynamiting fish,	30
Catching short trout,	24
Catching short bass,	15
Catching game fish out of season,	12
Seining game fish,	20
Catching bass in fish basket,	3
Fishing fyke nets in trout streams,	5
Gigging or spearing in trout streams,	11
Gigging or spearing bass,	1
Planting pickerel in trout streams,	3
Selling trout,	3
Catching sunfish out of season,	8
Dipnets,	17
Fyke nets,	22
Cast nets,	11
Bank nets,	2
Stir nets,	4
Gill nets,	3
Landing nets,	3
Seine nets,	41

Gigs or spears,	22
Fishing with the hands,	17
Fishing with layout lines,	39
Shooting fish,	3
Stunning fish,	2
Snaring fish,	6
Fishing with tipups,	19
Sunday fishing,	32
Fishing by drawing off the waters,	8
Obstructing the migration of fish,	4
Illegal fish baskets,	103
Illegal devices not specified,	35
Polluting waters,	4
Taking frogs out of season,	2
Interfering with an officer,	2

A comparison of the tables of legal proceedings since the creation of the Department shows a very interesting state of affairs. Apparently much better conditions prevail than in the past. According to the report of 1904, the number of arrests for illegal fishing was 783, or 247 more than during the year just closed, with a total number of 116 wardens, regular and special. The number of distinct offenses was 35. The number of arrests in 1905 was 530 or about the same as the present year, but the number of wardens had increased to 131. In 1906 the number of arrests was 495 or 41 less than in 1907, with about the same number of special and regular wardens.

By examining Table No. 4, it will be seen that by far the greatest number of arrests were made for one offense, namely, illegal fish baskets, operated under a new law, hence the comparative tables indicate a much better condition of affairs from a fish protective standpoint. An examination of Table No. 4 also will show the number of arrests of persons for violating laws relating to the capture of game fish has greatly fallen off, indicating that anglers are showing a quick and just appreciation of the laws and propriety of their being observed. It is chiefly the pot hunter element and the foreigners that are giving the greatest trouble, together with a section of the class that desire to catch fish by means of fish baskets and gigs.

One interesting feature of the fish protective work is the marked decrease in the number of arrests made by special wardens. Last year these men made 235 arrests. In 1905, 374. In 1904 they made nearly all the arrests. This year the special wardens only made 112 arrests, against 398 for the regular wardens, thus reversing positions.

The number of special wardens making arrests also decreased. These figures, however, do not indicate poor or indifferent work on the part of the special wardens. The reduction in the number of arrests by special wardens is undoubtedly due to the reorganization of the regular warden service last June, by which each regular warden was given a district and the activity of each regular warden in his district would naturally lessen the work of the special wardens. Apart from that, while out of the 143 specials, only 27

made arrests, a large percentage of the remainder exercised a strong moral influence in the community in which they live and by their presence and their activity prevented numerous violations, and as prevention is far more to be desired, much credit must be due to these men. Some of the specials who made arrests were just as active as the regulars. Among them may be noted George W. Fehr, who has a record of 14 arrests and 14 convictions, and Raymond Marcy, with 29 arrests and 29 convictions. Special Wardens Allison, Crittenden, Hover and Williams also showed great activity, these men in the aggregate making 38 arrests without any cases being lost.

It would be natural to suppose that among so many men, most of whom are naturally personally unknown to either the Commissioner or myself, and whose appointments were made entirely upon recommendation, that there would be a number who would turn out to be improper persons for the work and who would go wrong.

The position of a fish warden, whether special or regular, is one in which through the very nature of the work offers many temptations to do wrong, but I am glad to be able to report that the number of serious complaints were exceedingly small and only three were found to be well founded. Two of these were of a criminal character. One was that of George E. Riley, a special fish warden, who was appointed on petition of a number of reputable citizens of the county in which he lived. Riley was also a special game protector. He showed activity as soon as he was appointed and apparently was conservative in his actions. He reported two arrests with two convictions and fines aggregating only \$75, but shortly after his appointment various complaints were made against him, not only to this Department, but to the State Police.

An investigation was at once begun by both this Department and the State Police, and two months later Riley was arrested, charged with having in his possession, the same being dead, 130 undersized trout. Also for selling the same. He was tried and convicted before an alderman and sentenced to a fine of \$1,300. In lieu of payment he was sentenced to an imprisonment of 1,300 days in the county jail. He took an appeal to the County Court where the decision of the alderman was sustained and the appeal dismissed. He was then committed to jail.

A number of his friends and other persons who were not familiar with all the circumstances of the case, applied to the Board of Pardons for clemency, urging that the penalty imposed was excessive in comparison to the offense committed. Although higher courts in other states have declared that cumulative fines in fish and game are not excessive provided they do not exceed the total fixed for each specimen of fish or game unlawfully killed, the Department of Fisheries, which entered a protest against leniency, did not advance this proposition, but protested that the punishment was not excessive, because the real offense of the man was that he being a sworn officer of the law, violated both his oath of office and broke the laws which he was pledged to maintain, and that his offense therefore was much graver than though it had been committed by an ordinary citizen.

The State Police and also the Game Commission entered strong protests against clemency and the Board of Pardons thereupon refused to recommend a pardon.

The second case was that of Philip Miller, a special warden, who was captured by a regular warden fishing illegally with fyke nets in company with two or three persons. He was caught in the act and fined \$50 by the Justice of the Peace, which fine was paid and the man promptly dismissed by the Commissioner.

The third case was not a criminal charge, but simply of improper conduct, due possibly, partly to ignorance. He had entered verbal interference and obstruction while in the discharge of his duty, and on several occasions, it was charged, gave actual encouragement to people to violate the fish laws. An organization that had recommended his appointment investigated the matter along with the Department, the result of which was the man was dismissed.

There were a number of complaints made of undue and pernicious activity among the wardens of seeking to make arrests and secure convictions for the sole purpose of getting half the fines. A careful examination into the most of these cases showed the charges to be practically without foundation. The very table of arrests in themselves is a refutation of the arrests for 1907 of any such claim. It will be noticed that the average charge carried with it a fine of only about \$25. In nearly every instance where the fines reached \$100, it was for the most atrocious method of killing fish, dynamiting.

No written charges of any kind were brought against the regular wardens during the year. On the contrary most of them have received continuous and high praise by the newspapers and the sportsmen in the districts in which they are located.

From December to June 1st, the regular warden service was conducted as it had been in previous years and there were but five men on the rolls, namely, George D. Shannon, W. E. Shoemaker, J. E. Conklin, C. H. Nesley, M. F. Albert and myself, and most of these were without regular salary owing to the appropriation which was very small having been exhausted.

At the June meeting of the Board of Fishery Commission, \$20,000 having been appropriated for warden service, a re-organization of the service was made. The state was divided into nine districts and one warden assigned to each with an allowance for expenses. C. R. Holland, J. P. Albert and M. P. Maitland were promoted from the special list to be regular wardens on account of their good service, making the total number nine. As there are 67 counties in the state, each warden, including myself, had from seven to eight counties to patrol.

Such a territory is entirely too large to be thoroughly covered in the period it ought to be. In fact it is extremely difficult and sometimes impossible for a warden to cover his entire district within three months. Notwithstanding the difficulty of thoroughly patrolling such a large district, every warden, since the new regulations have gone into effect, have made at least one arrest in each county embraced in his district, which naturally means that there has been one arrest at least in every county in Pennsylvania, in the last six months.

No one warden should have more than three counties to cover and the chief warden ought not to have more than the Capitol county to care for. This means that the regular warden service should be increased to at least 22 men. The law at present limits the number to 12 and I earnestly urge upon the Board to ask the Legislature for the authority to increase and pay that many wardens.

The wardens who were on the regular force prior to the re-organization, three of whom were removed to other districts, continued to perform their duties with the same faithfulness and enthusiasm they had always done. I consequently gave my closest attention to the new appointees, J. P. Albert, M. P. Maitland and C. R. Holland. Mr. Holland had once been on the force but resigned.

The work of Warden J. P. Albert has given me much pleasure. His arrests only number 27, but according to all the reports which come in to the Department, they were made in such a manner that often most of those whom he was forced to apprehend had nothing to say against him. He has exerted a strong moral influence in his district. By persuasion and argument he has succeeded in putting a stop to a considerable amount of water pollution.

Warden Holland has an extremely difficult territory. It is full of lawlessness, more especially on the part of the foreign element. He has been shot at twice during the year and threatened with bodily harm many times. In fact none of the men have been subjected to as much abuse as Warden Holland for his plain performance of duty.

Warden Conklin, while on the rolls as a regular some time before the re-organization, really only began regular duty on the re-organization. He was assigned to a new and a difficult district in which trout streams are the chief waters and he has made a fine record for himself.

Wardens M. F. Albert and Shannon have likewise performed excellent service. The latter in one particular, particularly commended himself through his wise and conservative method of the enforcement of the new fish basket law. He visited every basket in his territory and on account of the law being new, with my approval and that of the Commissioner, he wrote to each licensee having an illegally built basket and notified them to make it lawful, otherwise he would be compelled to make arrests and he only proceeded against those who failed to comply with his directions.

Warden Nesley, who has made for himself a conspicuous record throughout Pennsylvania, having some knowledge of spawntaking was detached by the Commissioner from the warden service last May and June and during the month of November, in order to help in gathering wild fish eggs in field work. Hence his record of arrests is less than it unquestionably otherwise would have been.

Warden Shoemaker has maintained his high reputation for efficiency in his district, and people there are rapidly learning that he is performing his disagreeable duties, not only conscientiously, but with a full conception of his duty to the state and his oath.

Each and every warden has shown himself entirely fearless in the performance of his duties and this is high praise, for a warden's duties are often exceedingly dangerous. Probably a majority of

the regular force have been shot at at least once during the year, but none were injured. Warden Nesley was attacked by a number of fish pirates near Duncannon one night and severely injured. So severely that he was forced to go to a hospital in Harrisburg to have his wounds dressed.

It occasionally happened in former years that a warden, special or regular, would press for the imposition of the full amount of the fines for the offense committed. On one instance cumulative fines of \$10 per fish amounted to over \$500; on another it was \$1,500. There were several of \$300 and \$400 each. The Commissioner felt, and I heartily agreed with him, that while the imposition of cumulative fines was legal, and while higher courts in other states declared such fines not to be excessive such action was unwise. People who did not know the full circumstances of the case and people who desire to disparage the work of the Department were apt to use such instances to the disadvantage of the Department and fish protection. The warden making the arrest was accused of doing so entirely for the money which he might receive as his share, and it was calculated furthermore to bring about opposition to the fish laws. In one instance also a young man was sent to jail for two years and it developed that he was not the principal offender. The real offenders who made the young man their scapegoat escaped. In this case the Department joined in an appeal for pardon. Believing that very heavy fines were unwise, by direction of the Commissioner, all the wardens were advised to use discretion and be conservative and only in very aggravated cases to press for the whole penalty which might be imposed. For example, if a man were found with twenty-five or more undersized trout, not to make specific charges for more than ten, so that the fine would not exceed \$100, and even where two or three offenses had been committed the penalty for which varied between \$10 to \$25 only to press the charge for one of the offenses. The exceptions were where the warden was insulted and abused by the use of vile or abusive language, or where the man was a persistent law-breaker, or where the man had been arrested before for similar charges. I am glad to say that the orders in this respect have been followed.

While treating on the question of re-organization I omitted to mention the fact that your body framed a number of rules and regulations which are appended as part of this report. With the small force it has been difficult to comply strictly with every provision, but as this was recognized by the Board when the rules were framed the failure in each case was reported and approved at the office. For example in one instance the warden was unable to make a complete tour of his district within the three months owing to his having cases in court. Watching the operation of the rules and regulations I deem them to be wise and they appear to be working well. I cannot suggest any changes at the present time.

The regular session of the Legislature was held last winter and among the flood of bills relating to fish three became laws. One was entitled an amendment to section 2 of the act of May 29, 1901, but was in reality an enlargement. The bill as originally drafted had a commendable purpose, viz: legalizing tip-ups and defining the number which might be used for the catching of pickerel and

perch and the amount of these fish which might be caught by rod daily. But amendments were made to this bill and adopted which changed its entire character dealing among other things with legal procedure. By the new provisions the work of the Department of Fisheries would have been seriously hampered since it provided for jury trials exclusively for violation of the fish laws, making a criminal out of a fish law violator. Happily the Lycoming County Court promptly declared this part of the new act unconstitutional. The declaration was made by the Court in the form of granting a nol. pros. on the petition of the District Attorney, who averred that: "because the act of March 14, 1907, under which the prosecution in this case was instituted at least, so far as it attempts to change the method of procedure from a summary proceeding trial before a Justice of the Peace to a misdemeanor triable before a Court and jury in the Court of Quarter Sessions, is unconstitutional there being nothing in the title of said act which gives notice of an intention or purpose to make such a change."

The amended act just referred to has caused great confusion among fishermen, and trouble to the Department, one of the clauses providing that the words rod, hook and line in this act should mean method and not number. The word "act" in the amendment was manifestly unintentionally used for the word "section," because the use of the word "act" in itself if intended would have made the whole thing so clearly unconstitutional that even a tyro in law-making would not have used it. It would have been an amendment to the entire act, whereas the purpose was merely an amendment to the section and so stated in the title. It is another well-founded principle in law where an act is extended or amended to be constitutional it must have such portion as it is intended to be extended or amended set forth in the new bill. This was not done in the drafting of this bill, neither was any notice given in the title of this act to place any other construction upon the wording of the section than had ordinarily been handed down by the higher courts. In view of the fact that Section 31 of the act of May 29, 1901 provides rod, hook and line or handline, having not more than three hooks, for fishing for fish not specifically described as game or food fish, the Department was soon flooded with letters from all parts of the State desiring to know whether or not under the act of March 14, 1907, an unlimited number of rods or lines could be used for the catching of carp, suckers, mullets, catfish, eels and other fish not specifically described as game or food fish. The matter has never been clearly brought before the Court, but in view of the legal principle set forth above it was clear to my mind and to the Commissioner's mind that even though the amendment was constitutional in other particulars it could not apply to fishing for the fish named. It is naturally an absurdity to say that a man may use as many rods and lines as he pleases for game fish, and say that he should not use as many lines as he pleases for such coarse fish as carp, suckers, catfish and eels. Hence I advised all the wardens not to interfere with the use of an unlimited number of rods and lines which any fish which might lawfully be caught by that means until after an interpretation had been placed upon it by some court of record. Two arrests were made for using an unlimited number of lines for coarse fish after the signing of the bill by the Governor. One was made

by me and the other by a special warden. In both cases the arrests were made before official notice of the signing by the Governor had been given out, and moreover it happens that in both cases the parties were arrested for violation not of section 2 but of section 31, the catching of coarse fish with an unlimited number of lines. Both parties were convicted and fined.

The one commendable feature to my mind of the act was the original purpose of the introducer to provide means for fishing for pickerel and yellow perch through the ice. The one weakness was that it provided for a maximum number of pounds instead of the maximum number of fish which might lawfully be caught daily. Under this provision it was almost an impossibility at times for an angler not to break the law, and this fact has forced me, with the approval of the Commissioner, to advise wardens to allow a trifling lee-way in weight where it was evident that the last fish caught brought the aggregate weight beyond twenty pounds.

A second act passed was one permitting the use of gigs under certain conditions for the capture of carp, suckers, mullets and eels, and it was passed in the face of strong protests and with refusals to adopt amendments which would at least minimize the destructive character of this method of fishing.

From the first the Department has believed the act as drawn and passed to be unconstitutional. Its operation has more than justified the Department in the opposition which it made to its passage through the Legislature. The ill-effects were so manifest in many places that several members of the Legislature, I am informed, have frequently admitted to the Commissioner that they made a mistake in voting for the measure.

Immediately upon the signing of the bill blacksmiths in very many sections were overwhelmed with orders for the construction of gigs. One man engaged in this business informs me that in the latter part of June he had more orders on hand for gigs than he could fill in nearly two months. By the provisions of the act gigging was restricted to public waters only, but hundreds upon hundreds of men utterly disregarded this and fished in whatever waters they pleased and took whatever fish could be found. The number of public waters strictly construing the interpretation of the courts in the past in this subject numbered less than 300 in the State and of these 300 the great majority are trout streams, and under the act was unlawful in such waters to gig whether public or not. Complaints began to come in almost immediately from nearly all sections of the State, outside of the north west, that people were gigging for game fish and keeping them and doing it deliberately. It needs no special corroboration to support the statement that it is exceedingly difficult to catch a man lawfully using a gig with game fish if he desires to keep those game fish and not be caught.

Some of the wardens had sufficient reason to believe that game fish were being destroyed by gigging in large numbers, and this knowledge came under my own observation in the district under my special charge. One illustration will show to what extent this destruction was carried on and how completely it could be done without detection. In York County there is a tributary of the Bermudian Creek, known as the Branch. It is a body of water which will average fifteen to twenty feet wide and was noted for those

fish. In addition to suckers, eels and other coarse fish there were pickerel and sunfish throughout its length, and bass in the lower end. I came upon six men who were gigging this stream. They were wading abreast, shoulder to shoulder. They had in their possession a number of suckers and eels and a stone catfish, a species which is used only as bait for catching bass and other game fish. The fact of their having the stone catfish showed how completely they were taking everything which could be taken by the spear. In answer to my question why they had this little fish they stated that it was about all that was left in the stream. Their words were sorrowfully confirmed the next day after an examination of six or eight miles of the stream. Where previously fish had been seen in considerable numbers I found nothing except a few minnows, and occasionally a sucker. In order to test the question whether or not this stream was a public water within the meaning of the act the party, just mentioned, were arrested. The Branch is not a stream named by the Legislature in various special acts as a public stream. It was not a public stream under what is known as English Common Law, and was not a public stream according to the definition handed down by the courts at various times. The men claimed at first that it was private waters before the arrest was made and it was on this claim that it was decided to use this case as a test. Immediately on arrest the men raised the point that the stream was public by right of grant or usage, and the matter is now in the county court for adjudication. The defendants also have raised the point that the act is unconstitutional, and in this, with the concurrence of the Commissioner, I have directed the counsel to agree to. We even went further, and in our answer to the defendants' petition averred our belief that the title was deceptive and misleading in that the act was not within the provisions of the title. The title reads:

"An act to regulate the taking of carp, suckers, mullets and eels in the waters of this Commonwealth, etc." While section 1 of the act provides that, "it shall be lawful to kill carp, suckers, mullets and eels in the PUBLIC waters of this Commonwealth, etc." The absence of the word "PUBLIC" in the title appeared to us to be the deceptive and misleading clause. What position the Court will take of course is as yet unknown.

In my statement that game fish were being intentionally destroyed in different parts of the State I excepted the north west. My reason for doing so is because of a report made by J. P. Albert of Warren, a warden, concerning the operation of the gigging law in his section. He says:

"They are trying to live up to the law in gigging and are doing very well, but unfortunately a fish passing under the water at a fast rate and making a strike at it they cannot distinguish the fish. After they get the fish in they find their mistake and then throw it overboard, at least most of them do. I found a large number of game fish speared that way, particularly salmon and bass. Some salmon weigh as high as fifteen pounds. I have seen fifteen or sixteen exceptionally large ones.

"The people seem to try and live up to the law, but they cannot tell the species until after they are struck. The Allegheny and Conawango rivers are just dotted with boats when the weather is nice, also French Creek. I do not think they are doing a great deal of damage to the game fish according to the number of giggers. In all the number I have examined the boats have contained as high as three men and I have never found a hard fish, or what may be called a game fish among them, but I found almost all suckers, carp and Buffalo fish having as high as 100 to a boat.

"When hailed by a warden they immediately come ashore and allow the warden to search the boat. I have not found one illegal spear, they being an inch apart between the barbs. The best class of fishermen are against gigging, because no one can tell at what kind of a fish they strike. The best fishermen think the law should be repealed."

An examination of hundreds of gigs showed not only many of them to be unlawful, but that the majority in having the instrument made made their beards as close as possible. Many of the gigs which our wardens and myself passed would have been had they been closely measured, illegal. There was not one gig in three in which the prongs and beards were in every particular one-half inch apart. Especially was this the case with the spears to be used along the smaller streams. At the out-set most of the gigs were made with the prongs a scant one-half inch apart, with the beards less than a quarter of an inch and sometimes only an eighth. As there was a dispute regarding the legality of this the opinion of the Attorney General was asked and he promptly decided that the beards were part of the prongs and must be at least one-half inch apart.

A third measure enacted was one relating to the operation of fish baskets. It is intended to take the place of the fish basket act of 1903. In some particulars I feel that it is an improvement on the old law, but in many respects it does not meet the requirements either of the fishermen or the proper protection of game fish, or what I believe to be the best interests of the state.

Many fishermen complain of rank injustice which the new law permits. One of the chief objections which they urge is that although a man may build his wingwalls and secure a license for a basket at a certain spot for one year, that the next spring another man may step in and secure a license for the place he occupied and make use of his wingwalls, and the labor which he put on them the year before.

Another cause for complaint is that a man may get a license for a certain spot and there is nothing to prevent another man from getting a license for a spot immediately above or one side, which will cut him out and render his basket of little use. There is nothing in the act which regulates the length of wingwalls and some licensees have taken advantage of this to build their wingwalls from shore to shore, and more who have secured licenses below complain that by this action they are deprived of equal privileges in the stream.

There was one clear case of the seeming injustice of this. A man secured a license for a spot on Pine Creek in Tioga county, built his wingwalls, leaving a short space between the upper ends and the

banks. A second man secured a license a short distance above and built wingwalls several feet high and clear to the bank. On one night, it is claimed, that the man having the upper basket caught 1,800 eels, while the one below succeeded in getting less than two dozen.

These are only some of several complaints made by fishermen. They also complain that there are a number of minor provisions in the construction of a fish basket which is not at all material to the catching of fish, yet which from the specific nature of the provisions, subjects them to just as heavy a penalty as though they had filled their basket with and retained fish which might not lawfully be taken, as for example the color and size of the figures showing the license number.

Among the features which seem to me to operate against the interests of the state and the fish is the exceedingly low license fee. Under the old act the license was six dollars, one dollar of which went to the county treasurer and five dollars to the Department of Fisheries. Under the new act the license is one dollar, twenty-five cents of which is deducted by the county treasurer, seventy-five cents going to the Department.

The consequence has been a vastly increased number of licenses without a commensurate increase of revenue to the state. Indeed the total amount received this year from license fees was less, according to the Commissioner, than was received any year previously. By reducing the rate to one dollar, it affords opportunities for many persons who have little regard for the observance of fish laws to secure licenses. Six dollars was too much for such to risk, but not so one dollar.

Numerous allegations have been made that many parties operating fish baskets were keeping the game fish that were caught. It was impossible for the wardens to prove the truth or falsity of these allegations although there were good grounds for believing that the major part of them, at least, were true. There was a clause in the act, and to my mind, a very proper clause, which provided that all the fines imposed and collected for violation of the law should be turned in to the State and that no part should go to the wardens. As a consequence the special wardens who could not be employed even could not be expected to spend time and money on fish basket cases. Therefore the entire burden of suppressing the operations of the fish baskets fell on the shoulders of the six wardens, east of the Allegheny mountains, there being no baskets on the western side of that range.

Every licensed fish basket, and in fact every basket, was inspected by a warden, as far as known, and it is safe to say that outside of the majority of those who operated this device under the old law, 95 per cent. did not entirely conform to the law and fully 75 per cent. of those which did not conform to the law were defective in several important particulars. There were also a number of the baskets operated by former licensees which did not conform in every particular, but as a rule it was in minor points only, excepting those men which in former years regularly gave trouble.

The great majority of the baskets were little more than thrown together, made of the cheapest material and by their very character was calculated to hold any fish which might get into them. One of

the provisions of the law called for well rounded slats. A large percentage of the baskets scarcely had the corners shaved off, and some did not even take the trouble to do that, only picked spots out here and there, making them look somewhat like sawteeth. Others did not take the trouble to do that much, but left the edges sharp and rough. The law calls for these slats to be set three eighths of an inch apart when swollen by water, but a large number of the baskets were simply set three eighths when made, without any regard after swelling. A great many baskets had slats with the full space of not more than a quarter of an inch. The law required that at least three-fourths of the bottom of the basket that could be used for fishing be removable. Many paid no attention to that provision but made solid bottoms. Very few of the slats were planed but were of rough stripings, evidently from a saw mill.

Some appeared to think that eight inches out of a total width of five feet was three-fourths of the bottom. The law called for twelve inches, letters painted white or black. Eight, seven, six and even as low as two inches seemed to be regarded by a large number of people as conforming to the law. Gray, green, yellow and all sorts of colors were substituted for white or black. Occasionally a man would have a number on his basket while he was operating it, but took the numbers home with him when he left, leaving nothing to indicate who the owner of the basket was, and strange to say, according to a peculiar phrasing of the act, this did not seem to be strictly illegal.

As intimated before, there is nothing in the law to designate the length of wingwalls and many licensees therefore were in the habit of building the walls from bank to bank and some of the walls were five and six feet high in the small streams. Wingwalls of this character not only prevented the passage of rowboats, but also prevented the free migration of fish. There is reason to believe, however, that this construction of wingwalls from bank to bank is a violation of section 15 of the Act of May 29, 1901, which forbids the placing of any obstruction in the waters which will prevent such migration. It might be contended that as the basket act was passed after the act of 1901 that wherever any conflict occurred, the former section would be superseded by the new act, but a careful examination does not show that there is any conflict. Throughout the fish basket act there is an evident purpose not to obstruct the migration of any fish save eels, catfish, suckers, carp and mullets, which are specifically mentioned, as the fish which may be lawfully taken. If wingwalls are built from bank to bank, all other species of fish must necessarily at least enter the basket and presumably be caught, even if released afterwards. Hence there is grounds for holding that wingwalls from shore to shore is an obstruction to the migration of fish other than named and therefore unlawful. The Department at least has taken that ground, but recognizing that fish basket men might not have noticed this phase, all who built their walls in this manner were notified by the wardens to remove enough of the ends to allow a passageway for the fish on each side. The majority did so promptly whereupon action was not brought against them.

The permission to operate the basket throughout the entire day is perhaps one of the worst features of the new act. In the first

place out of all the men who had licenses in former years, not more than five per cent. asked for any such privilege. Many did ask that the basket be operated lawfully beginning with late in the afternoon. Some asked that it be operated in the day time when the water was muddy. The provision therefore permitting the basket to be operated during the day was entirely gratuitous.

Under the law where a basket is operated in day time the owner or attendant must be with it continuously save one hour. He may be absent that long. I am forced to declare such a provision a farce. Many of the baskets are within plain sight of the homes of the owners and frequently the baskets after being operated by attendants during the night are left with the bottoms in in the morning and when anybody comes along the owners or attendants simply jump into their boats, go to their basket and declare that had they only just left it. An examination of these baskets show oftentimes leaves, dirt and other debris, indicating that they have not been attended to sometimes for a day or more, but of course, there was no legal proof to that effect. It is safe to say, in my opinion, that one-half of the baskets operated during the daytime are not attended from morning until night.

I did on one occasion come upon a basket in operation in the day time without the owner having seen me for more than an hour. I found seven bass in that basket. The fish were being pounded back and forward by the falling water so that when I released them, they floated on in a sickly weak fashion which made me uncertain whether they would recover or not. After waiting a little more than an hour, I went after the man and arrested him and had him fined, but this is one of the few cases where we were able to detect this class of offenders.

I am satisfied that all of the provisions in this new basket law, the one which permits the owner to be absent at any time during the day, is working disaster to the game fish. Under the old act when baskets were allowed to be operated during the night only, it was rare to find any remains of game fish therein. Under the new act, it was very common for us to find dead game fish, or fishes of any kind other than those which might lawfully be taken in the baskets.

If fish baskets are to be allowed in the future, I consider it of the utmost importance that at the next session of the Legislature, this act be entirely remodelled and put in a shape fair alike to the fishermen and the fish.

As the fish basket law was only enacted last winter, I thought that those who took out licenses should have fair warning before any arrests were made for violations and that some latitude should be allowed. I therefore instructed all the regular wardens to be very liberal in the construction of the law and wherever possible whenever they found anything save flagrant violations, they should warn the licensee and in any event not to prosecute excepting where there were two or more provisions violated, and as far as I know, those instructions have been carried out to the letter.

I also instructed the wardens to first visit all the baskets possible and to make written notes of the character of the basket noting what violations of the law, if any, existed, and to bring the prosecutions later, if it were deemed advisable and necessary to do so.

The consequence was that when prosecutions did begin they were brought in numbers instead of being scattered through the season as they were in other years when the law was more thoroughly understood by the fishermen and there was no call for giving warnings.

Even when prosecutions were made for two or more violations, it was seldom that more than one charge was pressed so as to make the fine a minimum amount. In some instances this was entirely taken advantage of by the attendants in order to escape punishment altogether. For example, in Perry county a man had a fish basket which did not conform in any particular to the requirements of the law. Every provision was violated. A warrant was sworn out on the regular information which named every violation, but charges were pressed for only one and the man convicted, or to speak perhaps more correctly, only the minimum fine of \$20 was imposed. The counsel for the defendants took out a certiorari in which among other things he contended as a cause for dismissal of the case by the court so that the fine should have been \$70 instead of \$20, there being three specific offenses, no license at all on the basket \$20 fine; no attempt made to round the edges of the slats, \$20. Another a failure to remove three-fourths of the bottom of the basket a third \$20, and an absence from the device for more than an hour, \$10. Total, \$70. This illustrates the run which sometimes is attempted for the exercise of leniency.

A large number of appeals have been taken and undecided. Some of these appeals were taken in such a shape under the act that has compelled the raising of the question of the constitutionality of at least a portion of the act, that portion which refers to the legal procedure. As a matter of course it will be some time before this phase of the question is settled.

Within the last year many complaints came to the Department of the pollution of a number of streams of the state, some of which were investigated. Others could not be attended to owing to the smallness of the force. Although all pollution seems to be deleterious to fish life, owing to incomplete legislation, the Department is compelled to recognize this subject as being of two classes, poisonous and deleterious substances.

The poisonous class contains substances which invariably and quickly kill fish. The deleterious class contains pollutions which do not necessarily kill, but does drive the fish to other waters. Of the two classes the pollution caused by depositing deleterious substances is the most common and does the least harm. There are few large streams in Pennsylvania not tainted more or less by such deposits. It is this class of pollution that the Department of Fisheries is generally powerless to prevent as there has been no legislation conferring power to the Department of Fisheries to prosecute where such pollution is injurious but not altogether destructive to aquatic food life.

The character of the pollution most complained of comprises sawdust, mill shavings, pumice from cider mills, paper mills, chemical works, dye works, coal washings, sulphur water, refuse from gas works and common sewage, all of which, save perhaps the last, have a tendency to reduce or destroy our aquatic food supply.

The Department of Fisheries has no jurisdiction whatever over deposits of pumice and very little with respect to common sewage. Coal washings and tannery refuse are only partially under the jurisdiction of the Department of Fisheries, and sulphur water is also beyond its control.

Pollution containing poisonous substances, does, according to an opinion of the Superior Court, come clearly within the jurisdiction of the Department of Fisheries, and such violations will be punished whenever sufficient evidence can be obtained to substantiate a charge. Cases of this kind are extremely difficult to successfully prosecute and much care must be exercised in preparing them. Only the most skillful investigation will enable one to determine the nature of the pollution, whether it is poisonous or belongs to the class known as deleterious. To determine this is not easy by any means, as the two classes overlap so frequently that the dividing line cannot always be fixed to a certainty. Therefore it is advisable under existing laws to prosecute only the most flagrant violations.

The positive proof to be obtained in all cases is that the refuse will and did kill fish, and that it came from a specific establishment. The poisonous substances most commonly deposited into the waters by the industrial concerns in the state are vitrol, acids, arsenic, phosphorus, alkaloids, copper sulphate, chromium, chloride of lime, analine salts, chemical products and ammonia. While in most cases these ingredients are intended one to neutralize the other, they may be frequently found in a free state.

Two of the prosecutions recently brought by me as chief warden and resulting in the discharge of the defendants will illustrate the difficulties and technicalities to be encountered in cases of this kind. One was at Everett, in Bedford county. In this case thousands of fish had been killed in the Raystown Branch of the Juniata river, by some poisonous substance, apparently coming from a certain industrial establishment. A substance known to have a like effect was flowing from this industrial establishment at the time investigation was made, a few weeks after complaint was made to the Department.

More than a dozen witnesses were called and nearly all testified to the large quantities of fish found dead or floating on the water in a dying condition on the day in which original complaint was made and that no dead or dying fish were found above the industrial establishment nor on the far side of the stream. The actions of the fish showed something unusual; darting hither and thither out of the water and acting as though crazy. A peculiar substance was flowing into the river through a drain leading from the industrial establishment and down that part of the stream in which the effected fish were.

When we made our investigation we found similar substances flowing into the stream, but we were unable to prove the character and nature of the waste substance which flowed through the drain into the river on the day when the fish died. The parties making complaint failed to secure samples of the water on the day in question. As a consequence the defendants were discharged.

A second case occurred some months earlier in Adams county. There is a tannery there which had not been in operation for some time. The tanks contained lime water. The owner at length de-

cided to start up his plant again. On a certain day fishermen on a nearby stream noticed a sudden discoloration of the water and as suddenly fish rising to the surface and dying in large quantities, and every fish, including minnows, was killed for the entire length of the stream. An investigation showed it was claimed, that an employe of the plant had allowed the lime water to empty from the tanks into a drain which emptied into the creek. The Department was notified and I made a personal investigation.

The employe freely admitted that he had emptied out the lime water, but claimed that he did it by the orders of his employer. Suit was brought against the owner. At the hearing the man still admitted emptying the water and maintained his claim that he was simply acting under orders. The owner was called upon to testify, swearing that he had not given any such orders. On the contrary had directed the man not to empty the material into the stream unless high water in the creek happened to prevail, and then only in small quantities so as to do no harm.

The question of veracity or a misconstruction of orders arose and the Justice of the Peace, I think, very properly discharged the defendant. As there was the possibility of the man having misconstrued his orders, I decided it was not advisable to bring suit against the man who actually discharged the poisonous substance into the creek.

These two cases illustrate forcibly the difficulties to be encountered in the successful prosecutions in the case of polluting streams, even where such violation came clearly within the jurisdiction of the Department of Fisheries.

The number of important cases which served as a precedent for future work have been decided by the courts during the year and some others are still pending. The most important, unquestionably, of all these was the case of Commonwealth vs. Immel, charged with having allowed poisonous substances to be placed in a stream in sufficient quantities to kill fish. He was finally convicted before an alderman at Norristown. The case was appealed to the Montgomery County Court where the conviction of the alderman was reversed and the case dismissed. The Department took an appeal to the Superior Court. This was in 1906. Early in 1907 the Superior Court handed down a decision reversing the Montgomery County Court and sustained the contention of the Department and upheld its claim of jurisdiction in pollutions of that character.

The defendant then appealed to the Supreme Court but that tribunal refused to grant the appeal. Subsequently the Superior Court handed down a decision in another case at Scranton affirming and emphasizing its decision in the Immel case.

A second case was that of the Commonwealth vs. O. J. Smoyer et al charged with drawing off water from a dam and catching fish with their hands. They were convicted by the alderman and the defendants appealed to the Lehigh County Court. Judge Trexler handed down a decision upholding the Department and declared catching fish with the hands was illegal. The parties appealed to the Superior Court, but that tribunal refused to entertain the appeal on the grounds that the appellant failed to comply with the rules of the Superior Court.

Another very important case was that of the Commonwealth vs. J. H. Storch. He was charged with killing fish illegally in a pond. The defendant set up the plea that the waters were private and that he was the owner and lessee of several ponds and that the laws relating to fish did not apply and that he could therefore legally catch the fish in any way he pleased. The case was taken to the Bradford County Court. This likewise was a case carried over from last year. Early in the autumn of this year, the Judge of the Court handed down an elaborate decision adverse to the contention of the defendant and sustaining the contention of the Department that the laws relating to fish covered all the waters whether private or public.

This is the second decision of the kind since the creation of the Department, the first having been handed down a little more than a year ago in the Lehigh County Court in the case of Commonwealth vs. Weiler et al.

Another important decision was that of the Commonwealth vs. Humma. In this case the defendant was charged with using a large number of lines fastened to umbrella ribs and having attached thereto poles. The defendants appealed to the Berks County Court claiming that they were only catching suckers and that no way provided for catching this species of fish in the manner named. The Berks County Court upheld this contention whereupon the Department appealed to the Superior Court and that tribunal handed down a decision reversing the Berks County Court and sustained the contention of the Department that this class of fish were equally under the protection of the law with specifically named game or food fish.

A case which possibly is not yet ended recently arose in Lebanon county. The Mayor of Lebanon, together with some police officers including the Chief of Police, were charged by the Department with having drawn off the waters of a reservoir supplying the town of Lebanon, with having placed a screen across the stream below the reservoir and removing large quantities of fish. A great many of these fish were killed and others removed to other waters by means of the city water sprinkler, and others, it was claimed, were taken away dead by the defendants.

The testimony did not show that they took any of the fish for food, but the testimony did show to an extent sufficient to convict the Mayor and two of the officers, but not the Chief of Police, that fish were removed and fish were killed. The Mayor and two of the officers were convicted and fined. They petitioned the Lebanon County Court for an allowance of an appeal, contending that they had simply taken fish from the escaping waters and planted them elsewhere, and that furthermore, the reservoir was private waters over which the Department had no jurisdiction. The Court of Lebanon county, however, refused to grant the petition. I have heard unofficially that the defendants are considering the advisability of carrying the petition for an appeal to the Superior Court.

This case naturally excited a great deal of comment on account of the prominence of one of the defendants and to a lesser degree of the other defendants, being men sworn to uphold the laws of the Commonwealth, but I felt there was no alternative but to prosecute. There had been a number of other similar cases in the

same county in which citizens holding no position whatever and some in the humbler walks of life, it became my painful duty to prosecute and punish. For me to have passed over what was clearly the same offense perpetrated by the Mayor of a city, would have laid me and the Department of Fisheries open to severe adverse criticism.

The above is respectfully submitted.

J. W. CRISWELL,
Chief Warden.

JUDICIAL INTERPRETATION OF THE LAWS.

As has been heretofore remarked in these reports the Department has been fortunate that the laws covering fishing have been virtually codified, and the principal act is permissive in the sense that it prescribes the methods by which fish can be taken instead of stating in a negative way the methods by which fish cannot be taken. The latter form has always been conducive to trouble as it is so easy to evade a restrictive clause, for instance as there is a law of the state which forbids the playing of nine pins, yet the effect of this law has been nullified by making the game of ten pins.

The Department has acted on the line of thought that the act is a permissive one and has brought prosecution only where persons have used devices not specifically permitted by law. During the year a number of cases have been heard and the Department congratulates itself that its position in regard to the permissive terms of the act have been sustained.

In the Court of Bradford County the position of the Department was sustained in the case of a man who fished with a fish basket previous to the time allowed by the permissive act of 1903, contrary to the rulings of the Superior Court in the case of Commonwealth vs. Sealer where the Court decided that the act was entirely and only permissive. The same court also decided that a man who took a fish by this illegal device was also liable to two fines, one for using his basket illegally and one for taking the fish.

In a case from Berks county two men were arrested for fishing with a number of lines attached to rods stuck in the ground and to each rod was a bell that rang when a fish bit. There is nothing in the law which permits the use of such devices and the parties were arrested.

The Justice of the Peace before whom the men were tried discharged the prisoners on the ground that there was nothing in the law about using any number of lines, and when his attention was called to the decision of the Superior Court on the matter, averred that he knew more law about fishing than the Superior Court. The case was appealed to the Berks County Court and discharged under the act of 1903, but later the Court reheard the case and again dismissed it. The Superior Court, however, fully sustained the contention of the Department, that no method for taking fish is legal except it is specifically permitted by law. They therefore sent the case back to the Berks County Court, which under this ruling imposed upon each of the defendants the fine of \$25 and costs, thus fixing the law that no fish can be taken except by methods specifically mentioned in an act of the Legislature.

The Legislature of 1905 passed an act repealing that part of the act of 1876, which in the terms of the constitution prescribed that in cases of summary conviction either party could appeal upon an allowance of the Court of Record upon cause shown. This act, it was claimed by the Department, amended the constitution by an

act of the Legislature and was clearly unconstitutional. Several county courts sustained the opinion of the Department, but in Monroe county the Judge declared the act constitutional. From this opinion the Department appealed, but the trouble was that the decree of the court was an interlocutory one and the whole matter could not be gotten before the Upper Court. The Upper Court, however, sustained so much of the appeal of the Department by declaring the act of 1905 unconstitutional and sent the case back to the Court of Monroe County, where the court guided by the opinion of the Superior Court sustained the decision of the magistrate in declaring the persons guilty of using a fish basket illegally.

Another important case was one from Bradford county, where a man used a device not specifically permitted by law, but declared that the waters in which he used it were entirely private, being devoted by him to raising fish for market. In an able opinion the Court of Bradford County rules that all the waters of the Commonwealth come under the law and fish can only be taken therefrom by methods specifically permitted by law exactly in the line of all the decisions which have been made in regard to the present acts.

Lehigh county has sustained the position of the Department in regard to taking fish only by methods specifically permitted by law. The court decided that fish could not even be taken by the hands in the case where a dam had been drawn off and the fish were taken out in the shallow waters. The court said that the law was intended for the preservation of fish and prescribed the methods that the Legislature deemed wise by which fish should be taken. If, as the Court said, a man could draw off a dam and take the fish in any method he choose, there might be an epidemic of cleaning dams.

In Wayne county a very important decision was rendered in regard to what constitutes public waters.

The Lackawaxen creek had been declared a public highway by an act of the Legislature and the State had rebuilt a bridge across it under the terms of an act of Legislature which prescribes that the State shall rebuild bridges over navigable waters when such bridges have been washed away by floods. The Wayne County Court ruled that a mere act of Legislature could not make a stream a navigable one unless it can compensate the owners for the same, as otherwise it is in violation of the constitution which prescribes that no property shall be taken without compensation.

This decision is most important to the anglers and fishermen generally and has been appealed to the Superior Court.

To an amendment of the act of May 29, 1901, was added a provision which provided that any person violating the section should be guilty of a misdemeanor. This act was very far-reaching as the act of 1901 prescribes summary convictions for all cases and to allow appeals to the Upper Court for misdemeanors is to make a common criminal out of the violator of the fish laws. It would also enormously increase the expenses of the counties by sending up a large number of minor cases which would have to be heard by the Grand Jury and a Petit Jury. In amending the act in question the title of the act was not so amended and therefore gave no notice of the change. In a case of an appeal under the act the Court of Lycoming County promptly declared the act unconstitutional on the ground that there was no notice in the title.

One of the gravest questions that is constantly brought to the notice of the Department is the pollution of the streams.

The Department for two sessions of the Legislature has endeavored to secure the passage of a bill to prevent pollution, but failed to do so, and finally to test the matter brought suit in Montgomery county under the act of May 29, 1901, which prohibits the running of poisonous substances into the streams. The Court of Montgomery County dismissed the complaint on the ground that the defendant did not run the poisonous matter into the stream, but into a pit and had no intention to poison fish. The matter was appealed to the Superior Court which in a decision sustained the position of the Department that it is against the law to run poisonous matter into a stream and no sane man emptying deleterious matter anywhere knowing that in the course of nature that it will run into a stream and poison fish can claim exemption. The case was sent back for a hearing, but unfortunately the defendant died.

A case from Bradford county following the decision in the case of Commonwealth vs. Seacrist sustained the opinion of the Justice that parties using a fish basket without a license are liable to a fine. From this decision the defendants have appealed to the Superior Court, where it is now pending.

FISHING OUT OF SEASON AND TWO FINES.

Under the provisions of the act of April 27, 1903, it was lawful to use eel baskets for taking eels from the 25th day of August to the 1st day of December in each year, and the penalty for using a basket except in exact compliance with the terms of the act was decided by the Superior Court in the case of Commonwealth vs. Seacrist 27 Sup. C 423, to be \$25 under the provisions of section 2 of the act of May 29, 1901, P. L. 302.

The 14th day of August, 1906, Benjamin B. Ackley fished an eel basket in the north branch of the Susquehanna river in Bradford county, and did catch and keep one eel and one wall-eyed pike, the latter being a game fish which the law did not permit to be taken by means of an eel basket. Ackley was arrested by warden W. E. Shoemaker and taken before J. H. Oreutt, Esq., a justice of the peace at Towanda. The magistrate found the defendant guilty and sentenced him to pay a fine of \$25 for using the eel basket out of season and \$10 for the game fish. The defendant's counsel took out a certiorari and the case was argued before President Judge A. C. Fanning in the court of Common Pleas in Bradford county. The court sustained the verdict of the Magistrate and the defendant paid the two fines for what were two separate infractions of the law. The following is the opinion of the court:

Opinion of the Court.

Commonwealth } In the Court of Common Pleas of Bradford
vs. } County.
Benjamin B. Ackley, } No. 408, Sept. Term, 1906.

Illegal Fishing.

This case comes into court on certiorari and was argued Jan. 25, 1907. Upon complaint made by W. E. Shoemaker, State Fish War
13-21-1907

den, and after hearing, defendant was convicted of the offense charged, the finding of the magistrate being as follows:

"And now, August 17, 1906, after hearing the sworn proofs of both parties and the arguments of counsel respectively, the Court finds that the defendant, Benj. B. Ackley, on the 14th day of August, 1906, in Bradford County, Pa., in the North Branch of the Susquehanna river of the waters of this Commonwealth, did fish with an unlawful device prohibited and not permitted by law, to wit: a fish basket with wing walls, with bottom all in, in fishing condition, and herewith on said date between four and five o'clock A. M. did catch and take from said waters one eel and one wall-eyed pike, and keep and retain the said game fish and eel and place them in a boat in his possession, and did not return the same to said waters, and the said defendant was found alone in possession of said illegal device and fish therewith taken, all contrary to Sections 1, 2, 26 and 37 of the Act of May 29, 1901, P. L. 302, and the acts of assembly in such cases made and provided, and do hereby under said acts convict the defendant of fishing with the said illegal device and of taking unlawfully the said game fish, the said wall-eyed pike, and not returning the same unharmed to the water from which it was taken, and the said time and place.

The following exceptions were filed:

1. That the justice had no jurisdiction.
2. That the justice had no jurisdiction for the reason that the complaint, or information, is insufficient for the reason that it fails to show that the alleged offense was committed in the state of Pennsylvania.
3. That no seal was attached by the justice to the complaint in this case, and that the seal which now appears attached thereto, was placed thereon subsequent to the taking of the testimony in said case, if not even after certiorari was served, and the complaint is therefore insufficient.
4. That no certificate is attached to the complaint, or information, by the justice, showing when his commission expires, and the complaint is therefore insufficient, and the justice without jurisdiction.
5. The conviction is too general in its term, and not sufficiently specific, and defendant is thereby adjudged guilty of two or more offenses.
6. That the judgment or conviction, is insufficient, and will not support the sentence for the reason that it fails to set forth the time when, or the place where the alleged offense was committed.
7. That the sentence is illegal, insufficient and improper, for the reason that it fails to set forth to whom the said fine is to be paid, to wit: "One half to W. E. Shoemaker, the informer, and one-half to the treasurer of Bradford County, to be disbursed in accordance with Section 36 of the Act of Assembly of May 29, 1901, P. L. 302."
8. That in no event should more than one fine have been imposed, and the imposition of a double fine is illegal.
9. That there was no evidence in the case that the alleged offense was committed in public waters of this Commonwealth.

There is no merit in the jurisdictional question raised by the first and second exceptions. The Caption, as shown by the record, is

State of Pennsylvania, } ss.
Bradford County,

It is averred that the alleged offense was committed in the County of Bradford on the 13th and 14th days of August, 1906, in the North Branch of the Susquehanna river of the public waters of this Commonwealth. The language is too clear to be misunderstood. The words "this Commonwealth" is used, taken in connection with the naming of the County of Bradford as the place of the offense, cannot be construed to mean other than the Commonwealth of Pennsylvania, and fully sustains the finding of the magistrate that the act complained of was committed in the County of Bradford and the State of Pennsylvania.

The 5th, 6th and 8th exceptions may be considered altogether. Objection is made that defendant was convicted of two offenses, and subjected to the payment of two fines, and that such a conviction is not sufficiently specific. There is no authority for using a fish basket with wing walls excepting from the 25th of August to the 1st day of December in each year, and then only under certain conditions and restrictions. Defendant was found guilty of fishing with such device on the 14th day of August, several days before a basket could be lawfully used. The finding of the magistrate, we think, is sufficiently specific. He was, therefore, under the authority of the Commonwealth vs. Seecrist, 27 Superior Court, 423, fishing with a device not permitted by and contrary to law, and not having observed the provisions of the Act of 1903, was punished by the imposition of a fine of \$25 under the act of 1901, Comm. vs. Seecrist, *supra*. For illegally taking a wall-eyed pike, a game fish, of which he was convicted, he was properly fined \$10. The imposition of the two fines was not illegal. Comm. vs. W. H. Shupp, 32 C. C. R. 178, Terry, P. J. There a fine of \$25 was imposed for using an illegal device, and \$10 for the unlawful taking of a game fish.

The seventh exception raises a question with reference to which the authorities are not all in harmony. The magistrate did not direct to whom the fine should be paid. It is contended that this omission is fatal to the proceedings and in support of this position, counsel for defendant cites Comm. vs. McManus, 21 Lanc. L. R. 101, and Grimm vs. Rinehold 3 Dist. Rep. 668. In the case first cited the record was so incomplete as to be unintelligible. The transcript stated the proceeding to be "summons in criminal action not exceeding \$300." The finding was as defective as the statement of claim. What act of assembly was violated or to whom the judgment was payable did not appear, and there was nothing to support the proceedings. Grimm vs. Rinehold, *supra* is more nearly in point. There defendant was sentenced to pay a fine of \$10 on conviction of a charge of cruelty to animals, but no direction as to whom it should be paid. This was held to be fatal. The case cited, we think, is distinguishable from the one at bar. Here, not only the complaint, but the finding of the magistrate as well, sets forth the acts of assembly violated. In Comm. vs. Liller, 12 Lanc. Bar 188, an exception was filed to a judgment of a justice because it did not

state where or to whom the amount of the penalty was to be paid. The act under which the forfeiture was invoked provided a penalty of \$4 to be levied by distress. The exception was dismissed.

A justice is not required to show disposition of the fine when provision therefor is made in the statute under which it is imposed. *Grant vs. Comm.* 5 Justice L. R. 135.

Even though necessary to a conviction, that the act complained of should have been committed in the public waters of this Commonwealth which we do not decide, the 9th exceptions should not be sustained. Section 4 of the act of March 31, 1785, 2 Smith's Laws 311 Chap. 1144, provides, "Be it enacted by the authority aforesaid, that the river Susquehanna shall be deemed and taken to be a public highway, in all parts thereof within this state, from the division line of the State of Maryland and this state upwards, to the town of Northumberland, in the county of Northumberland, and thence by and along each of the two great branches of the same river which meet at the said town, in and throughout the whole length and breadth of the same river; and the duties and authorities of the Commissioners to be named as aforesaid, shall be extended and exercised accordingly." The title reads as follows: "An act to authorize the appointment of new Commissioners to execute the act of Assembly, entitled 'An act declaring the river Susquehanna, and other streams therein named, public highways, for improving the navigation of the said river and streams, and for preserving the fish in the same, and to extend the powers of the said Commissioners to all parts of the same river within this State.'

The defendants were charged in the complaint with illegal fishing in the waters declared by said act to be public highway. "A public statute is said to be such an one as effects the public at large, whether throughout the entire state, or within the limits of a particular locality, and whether its operation is designed to be perpetual or merely temporary." Endlich in the Interpretation of Statutes, Sec. 502. Statutes in respect to roads and navigation in general have been regarded as public statutes. Wharton's Law of Evidence, Vol. 1, page 259, Sec. 501, Endlich on Interpretation of Statutes provides, "One of the matters upon which, though the statute be silent, the Legislature must be understood to have an intention is that of the manner in which notice is to be taken by the courts of the passage, tenure and time of taking effect of the enactment. In the case of a public law, which must be taken to have been passed for the public advantage, it is obvious and therefore the universal rule, that in order to effectually serve that purpose, it must be noticed as to all the particulars mentioned and applied by the courts without being pleaded, proved or even called to their attention."

In Greenleaf on Evidence, Lewis Edition, page 8, section 5, it is said, "In fine, courts will generally take notice of whatever ought to be generally known within the limits of their jurisdiction." The court may take judicial notice that a certain township is within its territorial jurisdiction. *Comm. vs. Kaizer*, 42 W. N. C. 26.

The act declaring the Susquehanna river from the Maryland line north, together with its two great branches, a public highway, although to a certain extent local, is a matter of public concern, public benefits and general notoriety. In its operation the act was not limited to certain persons or classes or persons and interests.

For a hundred years, this river was a great thoroughfare, affecting and accommodating the public and affording transportation for lumber, supplies and merchandise to a vast extent and scope of territory.

The court, we think, may take judicial notice of the fact that the illegal fishing at the place designated was shown by the record and finding, and of which the defendant was convicted, was in public waters of this Commonwealth.

And now, April 6, 1907, the exceptions were dismissed.

By the Court,

A. C. FANNING, J. P.

ALL FISH CAN ONLY BE TAKEN BY METHODS SPECIFICALLY PERMITTED BY LAW.

Over two years ago George Kenny and H. J. Humma were arrested for fishing with lines attached to umbrella rods stuck in the ground and to the end of each was attached a sleigh bell so that when a fish bit the bell rang. Humma had thirteen lines and Kenny had four, and they had in their possession nine suckers. They were tried before Jacob M. Prutzman, a justice of the peace, at Birdsboro, Berks county, who discharged the men because he alleged there was no law that would punish them for taking suckers in any manner they pleased. The Department appealed the case to the Quarter Sessions of Berks County under the act of April 17, 1876, P. L. 29, but the court dismissed the case on the ground that the act of April 22, 1905, P. L. 284, had taken away the Commonwealth's right to appeal. The act of 1905 having later been held to be unconstitutional the Berks County Court allowed a reargument of the case and January 2, 1906, discharged the defendants, because suckers did not come within the protection of the act of May 29, 1901, P. L. 302, which opinion is published in the report of the Department of Fisheries for 1906, page 211.

From the decision of the Berks County Court the Department appealed to the Superior Court which reversed the decision of the lower court and stated decidedly that that act of May 29, 1901, provided all the methods by which fish can be taken except where in additional acts, such as the eel basket act, it is provided otherwise. The decision of the Superior Court is a very important one and determines that no method of taking fish is legal unless the fisherman can show the means he is using is specifically permitted by some act of the Legislature.

The following is the decision of the Superior Court:

In the Superior Court of Pennsylvania.

Commonwealth of Pennsylvania v. George Kenny and H. J. Humma

No. 87 October Term, 1906.
Appeal by the Commonwealth from the judgment of the Court of Quarter Sessions of Berks County.

Filed Feb. 25, 1907.

ORLADY, J.

An information was made against the defendants for "fishing with lines attached to umbrella bows, with bells fastened to the tips,

contrary to the act of May 29, 1901." At the hearing before the justice of the peace it was proven that Humma "had thirteen hand-lines with two hooks attached to each line, each line fastened to an umbrella bow stuck in the ground with a bell fastened to the tip;" and that Kenny "had four lines of the same kind." The defendants contended that they had not violated the law, "in using the devices with which they were fishing." They were discharged and an appeal was allowed the Commonwealth under the act of April 17, 1876, P. L. 29; and after hearing the appeal was dismissed (without reference to the constitutionality of the act of April 22, 1905, P. L. 284). The evidence showed that the defendants "had nine suckers between them" and the learned court below held that because of the title to the act of 1901, which is as follows: "An act to declare the species of fish which are game fish and the species of fish which are commercially valuable as food, and to regulate the catching and encourage the propagation of the same," etc., the statute cannot be made to apply to any other species of fish than those which it declares to be either game or food fish, and that all its provisions must relate to the catching, etc., of such: "that it (the title) gives no notice to include anything else, but distinctly excludes from its operation whatever is not therein declared to be within the one or the other category; it calls upon everyone to ascertain what is embraced in the statutory definition of game and food fish and exonerates him from any inquiry concerning what is omitted therefrom." Carp, catfish, eels and suckers are not in either class of game or food fish, though the time and the manner in which they may be caught is provided for in sections 6, 7, 8, 9, 11 and 31 of the act. Under the arguments of the appellee it would not be necessary to read further into the body of the act than its first section, which classifies and designates certain species of fish as game and food fish, as being specifically within the protection of the act, but this is a more narrow construction than is warranted by our decisions.

The title is to have a reasonable interpretation; and if it fairly gives notice of the subject of the act, so as reasonably to lead to an inquiry into the body of the bill, it is all that is necessary. It need not be an index to its contents, as has often been said: Allegheny County Home Appeal, 77 Pa. 77. It is not the purpose or the duty of the court to catch at pretexts to avoid legislation, where it can be fairly reconciled with the constitution; Mauch Chunk vs. McGee, 81 Pa., 433; Pottstown Borough, 117 Pa., 538; Gas Co. vs. Downingtown, 193 Pa. 255. The title is intended to give notice of the legislative intention to affect a right, a power, a remedy, a duty or a liability, and in a manner that those who may be specifically interested therein will be clearly invited to examine into the body of the statute: Overseers vs. Armstrong Co., 11 Pa. Superior Ct. 175; Commonwealth v. Beatty, 15 Pa. Superior Ct. 5; Commonwealth v. Minty, 19 Pa. Superior Ct. 283. The subject may have been one object while the means necessary for the attainment of that object may necessarily embrace subordinate objects subjects, differing in their nature and particular effect, yet all contributing to it, and comprised within the principal subject. Everything which the nature of the subject of a title reasonably suggests, as necessary or appropriate for the accomplishment of its expressed purpose, is

sufficiently indicated by such title: Commonwealth v. Jones, 4 Pa. Superior Ct. 362; Sugar Notch Borough, 192 Pa. 349; Commonwealth v. Gilligan, 195 Pa. 504.

The purpose of this act is clearly defined in the very words of the title to be "to regulate the catching and encourage the propagation of game and food fish," and these words reasonably invite an inquiry, not only into the number of, the times when, and the methods by which such fish may be lawfully taken, but as well the methods deemed necessary by the legislature to encourage their propagation, and the modification, if any, of former legislation on this subject. The fish excluded from the species of game and food fish enumerated in the act, are either indigenous to our waters or are placed therein by lawful authority and are clearly within legislative regulation. The title substantially, though without particularity, described the subject and purpose of the act, so that everything which reasonably pertains to that subject, is in law suggested by the title. The legislative purpose regulating the catching and encouraging the propagation of game and food fish cannot be known until every section of the act is read; in such an inquiry, the legislative will in regard to the methods, devices and appliances which may be lawfully used in fishing for other than game and food fish is unequivocally defined; so that the title is not misleading, every section being reasonably indicated through the subject matter stated in the title. To admit the use of an unlawful device, and at the same time contend that the act was not violated because the fish taken were not of the species of game or food fish is not consistent with the doctrine of the decided case. We held in Commonwealth v. Bercaw, 30 Pa. Superior Ct. 335, that the words of the section indicate that what the legislature had in mind was the "manner" of fishing. The guilt of the defendants did not depend upon what they caught, but in fishing for either game or food fish with a device not permitted by the act. Since regulation is made effective only through penalties, a title expressing a purpose to regulate implies such penalties: Commonwealth v. Rothermel, 27 Pa. Superior Ct. 649, and cases therein cited.

The judgment is reversed and a procedendo awarded.

After the decision of the Superior Court the following decree was rendered by the Court of Berks County:

Commonwealth vs. Kenny and Humma.	In the Court of Quarter Sessions of Berks County, Penna. No. 651 Misc. Docket, Page 326.
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Decree of Court.

And now, to wit: September 14th, A. D. 1907, the Court, on motion of Wolf & Shomo, Attorneys for the Commonwealth, in conformity with the judgment and decision of the Superior Court, in the above mentioned case, dated February 25th, 1907, orders the judgment of Jacob M. Prutzman, Justice of the Peace, in and for the Borough of Birdsboro, said County of Berks, reversed.

By the Court,

(Signed) G. A. ENDLICH, Judge.

After this decree was entered the attention of the court was called to the fact that the case had been up on an appeal not on certiorari, and therefore it was the duty of the court to sentence the defendants, which the court announced it would do.

Since the close of the year the Department has learned that December 14th, 1907, Judge Endlich imposed upon each of the defendants, Kenny and Humma, a fine of \$25 and costs. This ends the case which has been a long fought one, but the result has been of much value in that a definite determination has been reached. Here after any person who takes any species of fish by a method not specifically permitted by law is liable to a fine or imprisonment.

APPEALS IN SUMMARY CONVICTIONS.

Two years ago a number of persons were arrested in Monroe county for non-compliance with the act of April 27, 1903, allowing the use of fish baskets under certain conditions. After being sentenced before a justice of the peace they appealed to the Court of Quarter Sessions under the act of April 22, 1905, P. L. 284, which allowed an appeal from the judgment of the justice of the peace without an allocatur. This act had been declared unconstitutional by several county courts on the ground that by an act of the Legislature part of Article V, section 14 of the constitution was attempted to be repealed. Hon. C. B. Staples, President Judge of the Court of Quarter Sessions of Monroe county, took an opposite view and declared the act of 1905 supra to be constitutional. To this opinion the Commonwealth excepted and took an appeal to the Superior Court which in an opinion by Porter, J., declared the act of April 22, 1905, P. L. 284, to be unconstitutional and directed the case to be returned to the Court of Monroe County. There, the court acting under the opinion of the Superior Court, ordered that upon payment of the costs the sentence be suspended and the defendant discharged.

The following is the opinion of the Court:

Commonwealth } In the Court of Quarter Sessions of the Peace of
vs. } Monroe County of December Term, 1905, No. 15
T. B. Luckey. } Summary Conviction.

Opinion and Judgment of the Court.

Under the law as defined by the Superior Court in the case of Commonwealth vs. Seerist, 27 Supra, 423, we find that the defendant was technically guilty of violation of the act of May 29, 1901, P. L. 302 and that the act of April 27, 1903, P. L. 319, which made it lawful to catch eels in the waters of this Commonwealth by the use of fish baskets with wing walls, by a person having a proper license therefor, did not permit the defendant to fish or use in the waters of this Commonwealth any other kind of a device or basket, or in any other manner than that provided by said act of 1903, and we state for the information of the public that the placing of a fish basket in any stream in this Commonwealth, the slats of which

are not one full half-inch apart while in said stream, and which fish basket does not have a movable bottom in every part or division of the same, and which movable bottom is not removed between the hours of sunrise and sunset, violates the act of May 29, 1901, P. L. 302, and is liable to conviction and punishment for said violation. And we further hold that the placing of said fish baskets in the stream contrary to the provisions and regulations as above stated is a violation of the statute, whether the offender actually fishes with the basket or not. We make this statement so that the public may be informed of the provisions of the act as construed by this Court and in future govern themselves accordingly.

Although we find the defendant guilty of a violation of the said act, we are of the opinion, after having heard all the testimony in the case that he was not wilfully a violator. He had taken out a license under the act of April 27, 1903, and was fully of the belief that he was not a violator of the law. The very fact of having applied and paid for a license to use a fish basket was an evidence of good faith, and since there has been such a difference of opinion among judges as to whether or not the use of fish baskets was a violation of the act of May 29, 1901, laymen ought hardly to be held responsible for their mistaken interpretation of the law.

Taking this view of the matter it is hereby ordered and directed that upon the payment of the costs in this case, the sentence be suspended and the defendant discharged. February 19, 1907.

By the Court,

(Signed) C. B. STAPLES, P. J.

FISHING IN PRIVATE WATERS SPECIFICALLY UNDER THE LAW.

In October, 1905, J. H. Storch was arrested in Bradford county for taking game fish by means of a device not specifically permitted by any law of the Commonwealth. The defendant set up that the fish in question was taken from a pond and was leased by him as a fish pond for the culture and propagation of fish, and that the waters were entirely private property, none being allowed to fish therein. The justice of the peace discharged the defendant because he claimed that the fish laws do not govern fishing in waters that the public are not allowed to fish.

From this decision the Department appealed because it claimed that the State under its police powers had the right to govern the methods by which fish should be taken in any waters, whether public or private.

The question of the constitutionality of the act of 1901 was also raised. After argument the Court of Quarter Sessions of Bradford County declared in favor of the constitutionality of the act of May 29, 1901, P. L. 302 and that the State had the power to regulate the manner in which fish may be taken even in private waters.

This decision is one of the most important to the Department that has been made, as it shows that fish can only be taken in the Commonwealth by methods specifically permitted by law, and that the acts of the Legislature prescribing these methods are entirely within the constitutional powers of said Legislature. The decision

is not entirely a new one, because it was within the lines of decisions for many years, fish being an important element in the food products of a country and therefore very proper subjects for Legislation.

The following is the opinion of the Court:

Commonwealth } In the Court of Quarter Sessions of Bradford
vs. County.
J. H. Storch. } No. 135 February Sessions, 1906.

VIOLATION OF FISH LAW.

This case comes into Court on appeal, and was argued January 26, 1907.

The complaint avers "That one, J. H. Storch, on the 16th day of October, 1905, and prior to bringing this complaint, at Pike township, Bradford county, Pa., at what is known as Haight's Woolen Mill Pond, with force and arms, etc., did take, kill, catch, and have in possession (unlawfully taken) a game fish of the class, kind, genus and species known as pickerel, one in number, and which said pickerel the said Storch had so caught, killed and taken by shooting the same with a fire arm, same being a device not authorized by law for the taking and catching of fish, and all from and in the waters of this Commonwealth, the taking of the said fish by shooting being unauthorized by and contrary to law, and the fishing with said unlawful device being also contrary to Section 2 and 20 of the act of May 29, 1901, Pamphlet Law 302, and further all contrary to the act of Assembly in such cases made and provided."

The defendant admitted the act complained of but interposed as a defense that he was not guilty of violating any law of this Commonwealth for the reason that the fish referred to was taken from a private pond of which he was the lessee, and which was at the time of the alleged offense used by him for the propagation of fish, principally carp.

The justice found the following facts:

First: That the facts complained of in this case occurred in, on and at Haight's Woolen Mill Pond in Pike township, Bradford county, Pa., on the 18th of October, 1905.

Second: That the said pond is a large mill pond covering forty acres of land, said lands and those surrounding the same being the sole, exclusive and private property of John F. Haigh, who for several years had leased and demised the same to J. H. Storch, who, as lessee thereof, had for several years been and was using and occupying said waters and privileges as a fish pond for the culture and propagation of fish and principally carp, and was so occupying and using the same at the time of the alleged offense charged in this case.

Third: That the fish in this pond consisted of carp principally, with some pickerel and a very few bull-heads.

Fourth: That the said pond is located near the height of land in Pike township dividing the waters southerly and those flowing in a northwesterly direction, is a natural basin and marshy piece of land that by the use of an artificial dam made many years ago, the water is detained and accumulated covering the lands to the extent

stated, and is supplied principally by surface water, rain and melting snow, and from several springs in the immediate locality of the pond, and the waters discharge therefrom through two pipes, a large one near the higher portion of the dam where the water when high discharges and a smaller pipe about six inches in diameter very near the bottom of the dam, and that no fish can reach this pond from above, but the fish can to a very slight extent pass out of the discharge pipe of the pond and down the creek and finally into the North Branch of the Susquehanna river in Bradford county, and that the pond is a private pond where the fish are practically exclusively confined therein.

Fifth: That the said defendant was drawing the water of the said pond so as to take the fish for market, and he with his employe, Earnest Wright, were out on the pond in a boat with no other means of fishing but a shot gun, and then and there the said J. H. Storch did point a loaded gun downward into the water and intentionally shoot at and kill one large pickerel, a game fish, and did then and there take the same from the said water and into his possession and retained it, all as set forth in the complaint.

Sixth: That the said defendant in taking said game fish, did so with said illegal method at the said time and place, without specific criminal intent, and under the apprehension and belief that he had the right to do so in his private waters.

The defendant was discharged, the reason therefor being stated by the magistrate as follows: "And now, January, 22, 1906, the Court finds the facts as stated above, but that the defendant is not guilty of violating any of the laws of this Commonwealth for the reason that the fish laws do not extend to exclusively private waters as the said act gives no notice in its title, nor has the Legislature authority under the Constitution to extend its control over fishing in purely private waters."

Pending rule for an appeal, the attorneys representing the Commonwealth and defendant, made and filed the following agreement: "It is hereby stipulated and agreed that the decision of the above case involves the constitutionality of the act entitled 'An act to declare the species of fish which are game fish, and the species of fish which are commercially valuable for food, and to regulate the catching and encourage the propagation of the same; to define the public waters within the state from improper and wasteful fishing; to provide for the appointment of fish commissioners and fish wardens, and to declare their official powers and duties; to encourage and regulate the artificial propagation of game and food fish by said state fish commissioners; to regulate the distribution of the same in the waters of this Commonwealth; to provide penalties and punishments for the violations of this act,' passed the 29th day of May, 1901, P. L. 302, and that showing cause by deposition for taking the appeal to this case is waived, and that the said case may be considered regularly in court on appeal."

A decision of the case at bar involves consideration of two questions, viz: The power of the Legislature to control or regulate fishing in exclusively private waters, and second: If that authority exists, is the act of May 29, 1901, P. L. 302, constitutionally sufficient in its title or provisions?

It is not a matter of surprise that the owner of real estate upon which there is a private pond, should feel that he has a natural right to take fish propagated and confined therein at any and all seasons of the year without becoming amenable to the law. No decisions of the Superior Court or Supreme Court of this state decisive of this question have been cited. It has been held elsewhere, however, by the highest tribunals, that the taking of game and fish is not an inherent right but a boon or privilege, and that the state has power to regulate the manner in which fish may be caught, even in private waters. The case of the People vs. Doxtater, 75 Hun. 473, is in point, holding directly that a general legislative enactment which prescribed a closed season and prohibited the taking of fish during that period, applied to a pond as well as to any other waters, declaring that fish where they had any possibility of escape from private waters came within the prohibition of the law, and that such enactment was constitutional. Many authorities are there cited sustaining this position.

In the case of the People vs. Doxtater, *Supra*, the doctrine there-in stated was affirmed by the highest court of the state in 147 N. Y., page 73.

Commonwealth vs. Gilbert, 160 Mass., 157, is directly in point, and was followed in the case of Penn Forest Brook Trout Company 26 C. C. R. 163, by a decision to the effect that the Legislature may prohibit the selling and transportation of trout taken from private ponds during the closed season, and that such legislation is not unconstitutional and void and in violation of private rights and interests: it was also held in Comm. vs. Bender, 7 Pa. C. C. R. 620, that laws enacted for the purpose of regulating the time and appliances for catching fish, are a proper exercise of its police powers of the state. Assuming then that the state in the exercise of its police powers and for the public welfare has a right to regulate the manner in which fish shall be caught, even in private waters of the Commonwealth, the query arises, is the title of the act of May 29, 1901, P. L. 302, sufficient to give notice of, or call attention to the subject matter of the act as affecting the rights of the defendant, who was the lessee of a private pond and engaged in propagating and selling fish, principally carp. The title reads as follows: "An act to declare the species of fish which are game fish, and the species of fish which are commercially valuable for food, and to regulate the catching and to encourage the propagation of the same; to define the public waters within the state; to protect the public waters within the state from improper and wasteful fishing; to provide for the appointment of fish commissioners and fish wardens; and to declare their official powers and duties; to encourage and regulate the artificial propagation of game and food fish by said state fish commissioners; to regulate the distribution of the same in the waters of the Commonwealth; to provide penalties and punishments for the violation of the provisions of this act." It is earnestly contended that the title does not give notice to owners and lessees of private ponds and streams that they are affected by the act, and that, as relates to them, it is unconstitutional. The question raised is an important one. If the act applies to public waters only, then in practically numberless ponds and small streams throughout the Commonwealth, fishing may be carried on with impunity by almost

any means and at any season of the year. The result would be the practical annihilation therein of game and food fish.

As bearing incidently only upon the question under consideration, it was said in *Comm. vs. Ehrgood*, 6 Lack Jurist 320, "It is no defense that the fishing was done in the tail race of a mill on the lands of the defendant." In disposing of the case of *Comm. vs. John F. Weiler, et al* (Lehigh County) where defendants were found guilty of fishing with a seine in the waters of Helfrich's spring, contrary to the act of Assembly, approved April 26, 1905, P. L. 310, which permits the taking of carp, suckers and mullets from the waters of this Commonwealth under certain conditions, it was stated, "The act under which the charge was brought, applies to any of the waters of this Commonwealth and covers a pond of the kind referred to at the hearing, and in which the offense was committed."

It was suggested, obiter dictum, Terry, P. J., *Comm. vs. Shupp* 32 C. C. R. 178, "The prohibition of the act of 1901 *supra*, seems to embrace private as well as public waters. Its language is 'Any of the waters of this Commonwealth.' Moreover the defendant was not fishing on his own land."

In *Comm. vs. Snyder, et al*, Court of Quarter Sessions of Lehigh County, it was held that the owner of a mill pond who drew off the waters for the purpose of cleaning the dam caught ten pike with his hands, was properly convicted of fishing in violation of the act of May 29, 1901.

In *Comm. vs. Seerist* 27 Superior Court, 423, it does not appear that the question at issue in this case was directly raised, but it may be gathered from the record that the device was not permitted by and contrary to the Acts of Assembly, to which reference was made, was on defendant's premises. This he admits in his testimony and it is said by the court "In order to avail himself of the provisions of the act of April 27, 1903, the defendant must have complied with its provisions, else the fish basket or device discovered in and on his premises as charged, was an illegal construction not warranted by any statute and violative of the provisions of the act of May 29, 1901, P. L. 302, which was a codification of the former fish laws. Its first section classifies the game and food fish and prohibits fishing for game fish in any manner except by rod, hook and line, or with handlines, or for food fish with any other device than as specifically permitted by the act."

The principle is enunciated in Cooley's Constitutional Limitations 175 that "There has been a general disposition to construe the constitutional provisions liberally rather than to embarrass legislation by a construction the strictness of which is unnecessary to the accomplishment of the beneficial purposes for which it has been adopted." The natural tendency of the courts is to uphold legislation when it can consistently be done. *Comm. vs. Beatty*, 15 Sup. Ct. 13; *Mauch Chunk vs. McGee* 81 Pa. 433; *Howard's Appeal* 70 Pa. 344. The presumption is in favor of the constitutionality of statutes. *Comm. vs. Mintz*, 19 Sup. Ct. 283.

In Allegheny County Home's case, Pa. 77, it was held, "It will not do, therefore, to impale the legislation of the state upon the sharp points of criticism, but we must give each title as it comes before us a reasonable interpretation, *ut res Magis valeat quam pereat*. If the title fairly gives notice of the subject of the act,

so as reasonably to lead to an inquiry into the body of the bill, it is all that is necessary." The same principle is recognized in State Line and Juniata Railroad Company's appeal, 77 Pa. 429; Esling's appeal 89 Pa. 205. Comm. vs. Jones, 4 Sup. Ct. 362; Comm. vs. Green 58 P. S. 226; Downingtown Boro 193 P. S. 263; and numerous other cases. It is, however, a rule of construction that when the title of an act does not state its real purpose fairly, or with sufficient definiteness, to put those interested on inquiry as to its contents, it is unconstitutional.

In the case of Comm. vs. Penn Forest Brook Trout Co, Supra, the conclusion was reached in an able and exhaustive opinion that the subject of the act of 1901 is not clearly expressed in its title, is misleading and does not fairly give notice to the owners of private ponds that they are affected by the act and therefore, as to them is unconstitutional and void. Since that case was decided however in Com. vs. Geo. Kenny and H. J. Humma, 32 Sup. Ct., a decision has been rendered involving considerable of the title to the act in question, which, though not directly in point, has a bearing on the case at bar. Defendants were convicted of "Fishing with lines attached to umbrella bows with bells fastened to the tip, contrary to the act of May 29, 1901." They had caught by means of this device nine suckers. The lower court held that conviction could not be sustained because the title gave no notice that suckers or fish other than game or food fish were within the inhibition of the statute. The court, in disposing of the case, said, "Under the arguments of the appellee it would not be necessary to read further into the body of the act than its first section, which classifies and designates certain species of fish as game and food fish, as being specifically within the protection of the act, but this is a more narrow construction than is warranted by our decision. The title is to have a reasonable interpretation; and if it fairly gives notice of the subject of the act so as reasonably to lead to an inquiry into the body of the bill, it is all that is necessary. It need not be an index to its contents, as has often been said. The purpose of this act is clearly defined in the very words of the title to be, 'to regulate the catching and encourage the propagation of game and food fish,' and these words reasonably invite an inquiry, not only into the number of, the time when, and the methods by which, such fish may be lawfully taken, but as well the methods deemed necessary by the Legislature to encourage their propagation, and the modification, if any, of former legislation on this subject."

It was further said in the case last cited, "The title substantially, though without particularity, described the subject and purpose of the act, so that everything which usually pertains to that subject is in law suggested by the title. The legislative purpose regulating the catching and encouraging the propagation of game and food fish cannot be known until every section of the act is read."

The title sets forth the objects to be accomplished as follows:

First: To declare what species of fish are game and what are food fish.

Second: To regulate the catching and encourage the propagation of the same. This would seem to be sufficient notice to those specially concerned that the taking of fish is subject to restrictions and

limitations, and therefore, to invite investigation of the act itself to ascertain when, where, and in what manner, the privilege can be lawfully exercised. Such investigation would disclose the fact that it is unlawful to fish for game or food fish in any of the waters of this Commonwealth in any manner except with rod, hook and line, and between certain specified dates; that a person can catch game fish during the close season in waters owned by himself with a net only and for the purpose of stocking other waters, or the operation of a hatchery for the artificial propagation of fish; and that the possession, even of any dead game or food fish, except during the lawful period for the catching of same, and the space of six days after such period has expired, is visited with a penalty.

Third: To define the public waters within the state, meaning evidently waters open to the public generally for fishing, and which in stocking with fry from the state hatcheries, are entitled to preference.

Fourth: To protect the waters in the state from improper and wasteful fishing. It is significant that the word "public" is here omitted. The language is "The waters within the state" and appears to have been used in comprehensive rather than restrictive sense. The improper fishing sought to be guarded against would be the same whether in public waters or those not so designated. The protection of the act is general, and I think we are justified in saying that the prohibition embraces and applies to all waters within the Commonwealth, not only those which are designated, but to small lakes, ponds and streams as well, in fact wherever fishing would be wasteful and improper.

The title we think, when considered as a whole, clearly indicates the object and purpose of the act to be the protection and propagation of fish, and is sufficiently clear to direct an inquiry into the body of the act to ascertain the conditions under which game and food fish especially may be lawfully taken.

It is established by the evidence and findings of the fact that the body of water referred to was a mill pond for many years, covers about forty acres, is located in a marshy basin, fed by springs and surface water; that no fish can reach the pond from above but can escape to a limited extent through a discharge pipe into the creek below, and from thence into the North Branch of the Susquehanna river; the defendant as lessee, has for several years used this body of water as a private pond particularly for the propagation of carp, that he shot and killed in this pond as charged in the complaint, a large pickerel, the same being a game fish. It was taken in an illegal manner and the act of May 29, 1901, thereby violated. The fact that the fish was killed in a private pond or one leased by him for raising carp is no defense.

And now, October 23, 1907, the Court finds the defendant, J. H. Storch, guilty of illegally fishing and taking fish as charged in the complaint; let him appear for sentence.

By the Court,

(Signed) A. C. FANNING, P. J.

FISHING WITH THE HANDS ILLEGAL.

Some months ago five men were convicted before a Justice of the Peace in Lehigh County on the charge of having drawn off the water of a dam and taking a number of fish by means of their hands. The defendants appealed to the Court of Quarter Sessions of Lehigh County and raised the question whether taking fish by the hand is allowable under the law. The contention was that fishing implied the use of some artificial device, but the court over-ruled all these contentions and refused to allow the appeal from the summary conviction sustaining the verdict of the magistrate.

The case is of importance because the Court takes the ground that the act of May 29, 1901, P. L. 302 is designed for the preservation of fish and therefore in its language has taken every precaution to secure that end.

As the court remarked, if dams could be drained and fish taken by the hand from the shallow waters, there would probably be an epidemic of clean dams.

Upon the refusal of the Court of Quarter Sessions to grant the appeal the defendants took an appeal to the Superior Court where they suffered a *nolle prosequi*. The defendants had therefore to pay their fine of \$25 each.

Commonwealth of Pennsylvania
vs.
O. J. Smoyer, Edward Newhard,
Amos Arndt, Charles Funk
and William Smoyer. } In the Court of Quarter Sessions
of Lehigh County.

Opinion of court upon the petition for the allowance of an appeal from a summary conviction.

The defendants were charged with the violation of Section 2 of the act of 29th of May, 1901, P. L. 302, being an act entitled "To declare the species of fish which are game fish and the species which are commercially valuable for food and to regulate the catching and to encourage the propagation of the same," etc.

It appears that O. J. Smoyer, one of the defendants, is a miller, and that in order to clean the mill dam, he drew off the water of the same and after the water was taken off he caught fish with his hands, most of the fish being suckers, but ten of them being pike (the pike being a game fish under the act above referred to).

It appears that the fish were taken out of a pool of water which was left after draining the dam and placed in five heaps or piles, and that all the defendants participated in the act, although which one of them caught the ten pike, or any of them, is not specifically stated, they all having acted in concert and divided the spoils. There seems to be no dispute as to the facts.

The petition for an allocatur is carefully drawn up and avoids any denial of the facts. At no place in the petition whatever is it denied that they caught the fish with their hands, but the assertion is that the testimony before the justice fails to show that any one caught any pike except O. J. Smoyer. In order to move the court to grant an allowance upon a disputed question of facts, the defendants should specifically deny the Commonwealth's allegations.

The one question in the case is, whether taking fish out of the water by hand is a violation of the second section of the act above referred to.

It must be conceded that the miller had the right to draw off water from his mill dam for the purpose of cleansing same but had he the right to take the game fish found in said dam?

The record raises this question very fairly, the magistrate expressly in his record stated that the charge against the defendants is, drawing off the water and catching with their hands. If I were to allow the appeal I could not state the point involved with greater precision upon the subsequent trial of the case before me. I do not think it therefore necessary to allow the appeal in order to raise the question of law involved. The defendant has the right to appeal on the refusal of an allocatur.

See *Thomson vs. Preston* 5. Sup. C. 154;

Commonwealth vs. Hendley 7 Sup. C. 356.

The appeal is in effect a certiorari and the point of law here involved plainly appears on the record.

Is catching of fish with hands a violation of the second section of the act? The section reads as follows:

"That from and after the passage of this act it shall be unlawful to fish for game fish in any of the waters of this Commonwealth in any manner, except that of rod, hook and line or with hand-line having not more than three hooks, or for food fish with any device not specifically permitted in this act."

The verb "fish" is defined in the Century Dictionary—to catch or attempt to catch fish; be employed in taking fish by any means as by angling or drawing nets.

The defendants contend that the term fish means when a man uses a rod or net or a spear or some other device as with bait in order to catch fish. The language of the act, however, is very broad and the word "fish" evidently is intended to mean the catching of fish by any means other than by rod, hook and line or with handline having not more than three hooks. The word "fish" has a broader significance than fishing with any particular device. Whilst fishing with the hand may be a very primitive method, still it is covered by the act and is not unknown to those who are well versed in fish lore. Whilst the miller had the right to draw off the water of his dam he had no right to take the game fish that he found in the dam. It is true that the fish may have died if the dam had been entirely drained but the same fate awaited them in the hands of the defendants. The act is designed for the preservation of fish, and if the draining of mill-dams and the taking of game fish from the same by hand is not a violation of the act, I fear that in some cases, mill-dams will be kept remarkably clean and have frequent emptyings. I am of the opinion that catching fish by hand is a violation of the act. I therefore refuse the allowance of an appeal.

Now, January 28, 1907, allocatur refused.

By the court,

FRANK M. TREXLER,
President Judge.

After the refusal of the allocatur by Judge Trexler the counsel for the defendants took an appeal to the Superior Court. Being a criminal case it followed that Court to Pittsburg and the attorneys in the case agreed it should go over to the Philadelphia sitting, which was held the week of December 2, 1907. The defendants failed to comply with the rules of the Court in that they did not file a paper book and the case was ended with a nol. pros. The defendants were therefore directed to pay the fines imposed by the Justice of the Peace, that is \$25 each.

THE QUESTION OF PUBLIC STREAMS.

In the spring of 1906, H. J. Foster went trout fishing in the Lackawanna creek. He entered the stream from the abutment of a bridge erected by the State, and at no time left the water, wading to fish.

The owners of the land along the stream had posted notices under the terms of the act of April 14, 1905, forbidding all trespassing on their premises. Foster was arrested on suits brought by three different landowners and a fine was imposed by the magistrate in each case. The defendant took an appeal to the Court of Quarter Sessions and claimed that under an act of Assembly the Lackawaxen Creek had been declared a public highway, and by the act of May 29, 1901, such streams were free for the public to fish in. The Court over-ruled the claims of the defendant and in a long opinion decided that a small stream cannot be made a public highway by an act of the Legislature. To decide otherwise the Court said it would be to take private property without compensation which would be unconstitutional. The Court therefore sustained the judgment of the magistrate and ordered the defendant to pay the fines.

From this decision an appeal was taken to the Superior Court at the suggestion of a number of anglers of the State who saw in the sweeping decision of Judge Purdy, if it were allowed to stand, that there would be so few public streams in the State that the anglers would have no chance to ply their vocation.

The defendant being financially unable to carry on the suit, subscriptions were asked for and received from anglers and Fish Protective Associations. The case will come up for argument shortly in the Superior Court and the result will be looked for quite anxiously by every person who is interested in fishing in the small streams of the State.

H. J. Foster } No. 31 April Sessions, 1906.
vs. }
David Hopkins } Fine, \$10, costs, \$1.50.

H. J. Foster, } No. 32 April Sessions, 1906.
vs. }
Floyd Manaton, } Fine, \$10, costs, \$1.50.

H. J. Foster, } No. 33 April Sessions, 1906,
vs. }
W. F. Sherwood. } Fine, \$5.00; costs, \$1.50.

These cases are appeals by H. J. Foster who is named in the transcripts as plaintiff, but who is, in reality, the defendant in above stated cases.

The Justice's transcripts state:

"Warrant in trespass on posted private property. Plaintiff brings suit against defendant for trespass on Act of Assembly, an act making it unlawful to trespass on posted private property." And this is all that appears in the justice's record to sustain the proceedings. But the counsel who represents the appellant waive all questions of informality in the record and proceedings and request us to consider the cases upon their merits, as disclosed by the testimony.

The cases are substantially similar and our rulings upon the questions involved in the first case will apply to all.

The complainant, David Hopkins, was the owner of the land upon which the alleged trespass was committed and, at that time, had proper notices posted thereon, in compliance with the act of April 14, 1905, under which the action was brought. The Lackawaxen Creek runs through said land and the defendant, on the 17th of May last, entered the creek at the crossing of the highway and, keeping within the banks of the stream, followed its bed (fishing) through complainant's premises.

The Act of Assembly of March 26th, 1814, P. L. 1814, page 187, the Lackawaxen Creek, at the point in question, with several other creeks, is declared a public highway, "for the passage of rafts, boats and vessels."

The 23d section of the act of the 29th of May, 1901, P. L. 1901, page 302, provides: "That from and after the passage of this act, public fishing shall exist in the following waters of this Commonwealth: All waters within land owned by the Commonwealth; all waters and parts of waters that have been or may be declared navigable by Acts of Assembly or public by common law; and such other waters made public by its owners, by grant or usage."

It is contended on the part of the appellant:

1. That the act of 1814, above cited, gave him the right to follow the bed of this stream for fishing purposes;
2. If, under that act, he was not so entitled, then by the 23d section of the act of 1901, above quoted, this stream falls within the class of waters therein designated as open to public fishing—as one "declared navigable by Acts of Assembly"—and the right was thus given.

These propositions are denied by the complainant and the issue is thus presented.

This stream, ordinarily, affords but little water, and is not susceptible of—and has never been used for—the passage of rafts, boats or vessels. It has, however, been used sometimes, during freshets, for floating loose saw-logs; which method of use, accord-

ing to the decision in *Derick v. Wood* 15 Pa. 9, is within the purpose prescribed by this act.

The great rivers of the State which are navigable by nature, are public highways at common law. The Commonwealth, having dominion over these streams, has an unquestionable right to declare them public highways, but this is not necessary to make them such, and the only effect of such a statute is to bring the stream within the mill-dam act of the 23d of March, 1803. If a stream is not in fact navigable it cannot be made so by the mere passage of an Act of Assembly. "If the stream is not actually navigable, so that there is no public right of way therein, a declaration by the Legislature that it shall be regarded as navigable is a taking of property for public use; and unless compensation is made the statute will be in conflict with the constitutional provision requiring compensation in such cases;" *The Barclay Railroad & Coal Co., v. Ingham*, 36 Pa., 194; *Farnham on Waters*, 103, 119.

With respect to the smaller streams and creeks the State grants to the riparian owner the soil over which they flow, without any reservation respecting them. But the property so granted is, nevertheless, subject to the public easement of the use of such streams for the purpose of navigation, so far as they are capable of it; *Railroad & Coal Co., v. Ingham*, *supra*. In such streams the public have no right of fishing; *1. Wood, Nuisance*, 3d Ed. Sec. 450; Nor the right to shoot fowl; *Winous Point Shooting Club v. Bode*, 20 Ohio, C. C. 637. And the same rule is held in *State v. Shannon*, 38 Amer. Reports 599, and in *Sterling v. Jackson*, 13 Amer. Reports 405. And see the very elaborate opinion of the Supreme Court of Washington in *Griffith v. Halman*, 54 L. R. A. 178, in the same line. In short the navigation right is a right of passage only and for all other purposes the exclusive right rests in the riparian owner. *Farnham on Waters*, Vol. 2, 1,375, &c.

It appears—and it is claimed as an important fact in the case—that under the act of the 3d of June, 1895, P. L. 1895, page 130, the State has recently constructed several bridges across the stream in question.

This act requires the State to rebuild county bridges destroyed by casualty "over and across the navigable rivers and such other streams as have been declared public highways by the Act of Assembly."

But we cannot see how the fact that the State authorities have considered the rebuilding of these bridges a state duty under this Act of Assembly, affects the question at issue one way or the other.

From what precedes we conclude:

1. That the stream in question is not navigable within the accepted and proper meaning of the term.
2. That the Act of Assembly declaring it a highway for the purposes therein specified gave the public no rights in the premises not previously possessed by it.
3. That the public did not possess the right of fishing in this stream before the passage of the act of 1814, and acquired no such right thereby.
4. That the stream in question does not come within the class mentioned in the 23d section of the act of 1901, as open to public

fishng; and, if it did, the act, in our opinion, would be inoperative to impose a servitude upon the complainant's premises, as contravening the Constitutional provision that private property shall not be taken for public use without just compensation being first made or secured.

If these premises are correct it follows that, in entering upon the complainant's land, the appellant was a trespasser, and as such, was liable to the penalties imposed by the act under which the proceedings were instituted. And so we hold, and find and enter the following judgment of conviction:

Now, January 14, 1907, H. J. Foster, of the County of Wayne, and the State of Pennsylvania, yeoman, is convicted before the Court of Quarter Sessions of the Peace of Wayne County of wilfully entering upon land owned by David Hopkins, on May 17, 1906. Said land being situated in Clinton Township, in the County of Wayne aforesaid; printed notices having previously been prominently posted upon said land, by said owner, stating that the said land is private property, and warning all persons from trespassing thereon under the penalties provided in the act of Assembly No. 124, approved the 14th of April, 1905, which notices remained so posted at the time of such entry by the said H. J. Foster.

And it is adjudged that for the said act of trespass the said H. J. Foster forfeit and pay a fine of five dollars, with costs 6*f* suit, to be distributed according to law. And in default of payment of said fine and costs, that the said H. J. Foster be committed to the county jail of said county for the period of five days, being one day for each dollar of said fine.

(Signed) BY THE COURT.

UNCONSTITUTIONALITY OF ACT DUE TO DEFECTIVE TITLE.

The last Legislature passed an Act which was approved March 14, 1907, which was first introduced for the purpose of amending Section 2 of the Act of May 29, 1901, so as to allow the taking of yellow perch and pickerel by means of tipups through the ice, the number of tipups not to be limited but the amount of fish which could be taken by any one fisherman in any one day shall not exceed twenty pounds. While the bill was before the Legislature it was amended as follows:

"Any person violating any of the provisions of this section shall be guilty of a misdemeanor and on conviction thereof shall be sentenced to pay a fine of not more than twenty-five dollars: Provided, that 'rod, hook and line,' in this act shall mean the manner of fishing and not the number of rods used."

These two amendments were not noted in the title of the act as it passed finally. May 10, 1907, Charles Jones was arrested for using a device contrary to the provisions of the Act of May 29, 1901. He waived a hearing under the act of March 14, 1907, and was held

to court under the provisions of that act making the case a misdemeanor. Before the case came to trial the District Attorney noted the defect in the title of the act in that it gave no notice of changing the proceedings under the original act. He therefore moved the court for a leave to enter nolle prosequi because of the unconstitutionality of the act. This leave was granted and the prisoner discharged. The following is the record of the court:

Commonwealth vs. Charles Jones.

The Act of March 14, 1907, so far as it attempts to change the method of proceeding from a summary proceeding, triable before a Justice of the Peace to a misdemeanor, triable before Court and Jury in the Quarter Sessions, is unconstitutional, there being nothing in the title of said Act which gives notice of an intention or purpose to make such change.

Constitutional Law—Summary Proceedings—Court of Quarter Sessions—Misdemeanor.

No. 29, June Sessions, 1907, Q. S. of Lycoming county.
W. H. Spencer, District Attorney, for plaintiff.
Nol. pros. granted July 1, 1907.

WM. W. HART, P. J.

INFORMATION.

State of Pennsylvania. } ss:
County of Lycoming,

Personally appeared before me, an alderman in and for the City of Williamsport, county aforesaid, J. W. Criswell, State Fish Warden, who, after being duly sworn according to law, does depose and say that one Charles Jones did, on or about May 10, 1907, at the city of Williamsport, county aforesaid, on the West Branch of the Susquehanna river, the same being one of the waters of the Commonwealth, use an illegal device not specifically permitted in this act, to wit: a dip net more than five foot spread, all of which is contrary to the Act of Assembly approved May 29, 1901.

Sworn and subscribed before me this 19th day of May, 1907,
J. W. CRISWELL, State Fish Warden.
HENRY C. KELLENBACH, Alderman, Commission expires May 3, 1909.

Commonwealth v. Charles Jones.

Defendant waives hearing May 10th, 1907, and held in \$100 bail for June Sessions, 1907.

And now, July 1, 1907, comes W. H. Spencer, District Attorney of said county, and moves the court for leave to enter a nolle prosequi in the above stated case for the following reason, to wit:

Because the Act of March 14, 1907, under which the prosecution in this case was instituted, at least so far as it attempts to change the method of proceeding, from a summary proceeding triable before a Justice of the Peace, to a misdemeanor triable before Court and

Jury in the Quarter Sessions, is unconstitutional, there being nothing in the title of said Act which gives notice of an intention or purpose to make such change.

W. H. SPENCER,
District Attorney.

And now, July 1, 1907, leave is granted to enter nol. pros. as prayed for.

BY THE COURT.

POLLUTION OF STREAMS.

The question of pollution of the streams is one of the most important that the Department has had to face. Constant complaints have been received of the destruction of fish by deleterious matter which has poured into the streams, especially from manufacturing establishments.

The Department has endeavored to secure legislation upon the subject, but has been unable to secure the passage of any bill that squarely meets the question. There is a provision in the act of May 29, 1901, P. L. 302, which prohibits the running of certain substances into the streams.

From Montgomery county came a complaint that the proprietor of a dye works was discharging poisonous substances which finally found their way into a stream. Suit was brought before a magistrate and the Department showed by testimony that the substances which were discharged from the mill in question were poisonous and that they reached the stream and killed the fish. The charge was brought under section 26 of the act of 1901 and the magistrate found the defendant guilty and fined him \$100.

An appeal was taken to the Court of Quarter Sessions where, after a hearing, the Judge discharged the defendant on the ground that the provision in question did not apply to him. An appeal was then taken to the Superior Court which reversed the word of the Lower Court and sent the case back for trial. The opinion is an important one inasmuch as that it decides that the act in question is a valid one if it can be shown directly that substances discharged from an establishment and which finally reach a stream, are poisonous. It also is important from the fact that it says specifically that in cases of appeals from summary convictions the court should hear the case upon evidence adduced before it and then determine whether the evidence bore out the information.

The defendant took out a writ of certiorari to the Supreme Court which was not granted by the Upper Court and the case would therefore have come up for trial, but unfortunately the defendant died.

In the Superior Court of Pennsylvania.

Commonwealth } Appeal from order of Quarter Sessions of
v. } Montgomery county.
Edmund I. Immel. } No. 141 October Term, 1906.

Filed April 15, 1907.
Rice, P. J.

The defendant was summarily convicted before a justice of the peace of violating sec. 26 of the act of May 29, 1901, P. L. 302.

Upon special allowance he took an appeal to the quarter sessions and upon his motion the court quashed the proceedings before the magistrate, annulled the sentence and discharged the defendant. The court held, in an opinion filed, by its learned president judge, "that the defendant's acts are not contrary to the provisions of the section under which he was convicted." The acts referred to by the learned judge are not such as were established by evidence adduced at a trial or hearing in the quarter sessions—for there was no trial or hearing there upon the merits—but the acts alleged in the information and in the evidence adduced before the justice of the peace as shown by his transcript. Briefly stated, the charge in the information was that the defendant unlawfully and wilfully placed or discharged into the waters of the Commonwealth, to wit, into Deisher's run which empties into the Schuylkill river, "certain poisonous substances consisting of dye substances, bichromate of potassium, sulphate of copper, sulphuric acid and other poisonous combinations of said substances." As shown by the transcript, the evidence given before the justice of the peace relative to the charge was to the effect that the defendant is the proprietor of Bramcote Dyeworks; that the "discharge from said works flows into pits and from these pits into Deisher's run;" that the liquids coming from this place contained poisonous substances among which were "aniline, chromine, sulphate of copper, chloride of copper, sulphuric acid, hydrochloric acid, and other substances all of which were deadly poison, and would destroy the life of fish or other living beings;" and that the result was to kill the fish in the stream at and near where the poisonous liquid flows from the defendant's works into the run. For present purposes we must assume that the Commonwealth would have been able to establish these facts, if the court, instead of quashing the proceedings, had heard the case upon evidence adduced before it in accordance with the practice recognized as appropriate in appeals from summary convictions.

Section 26 of the act of 1901 reads as follows: "That from and after the passage of this act it shall be unlawful to fish in any waters in this Commonwealth with dynamite, nitro-glycerine, torpedoes, electricity, quick-lime, or with any kind of explosive or poisonous substances; or to place such substances in any waters whatever, except for engineering purposes, when written permission has been given therefor by the proper national, state, city or county official or officials. Any person violating any of the provisions of this act shall on conviction thereof as provided in section 38 of this act, be subject to a fine of one hundred dollars and imprisonment of six months in the county jail."

Before proceeding to a discussion of the main question it will be well to notice preliminarily the question as to the penalty for violation of this section. Notwithstanding the language of the section is broad enough to cover every violation of the act, there is reason furnished by other sections for holding that for many of the violations of the act the penalty here prescribed does not apply. It is unnecessary, however, to go into any extended discussion of that question, for it is clear that for a violation of this section the penalty is that prescribed therein.

It is contended that the words "to place such substances in any waters whatever" should be construed as applying only to those

substances the chemical composition of which is such as to make them both explosive and poisonous. The reasoning in support of this proposition is ingenious but not convincing. The word "such" obviously relates to the two kinds of substances already mentioned, namely explosive substances and poisonous substances, and cannot be construed to exclude non-explosive substances of the latter kind.

Another contention is that the substances, whether explosive or poisonous, must be used in connection with the act of fishing or, as the learned judge below expresses the idea, "The act intends something done or committed, directly connected with the catching of fish, or the result thereof." But the clause construed in this way would be a repetition of what had already been provided in the preceding clause of the section. The fact that a given construction of a statute would make a sentence or clause superfluous is some reason for the rejection of such construction, and the reason is stronger where the section in which the clause appears is a substantial re-enactment, with this change, of a prior statute upon the same subject which the later statute supersedes and repeals. "The rule which permits a resort to repealed and superseded statutes in pari materia, is one of great importance in the construction of statutes which re-enact, with changes, and repeal former ones, and in that of enactments containing revisions or codifications of earlier laws. As to the former it is obvious that a change of language is some indication of a change of intention." End. In. Stat. sec. 51. The pertinency of these observations is apparent when it is noticed that it is expressly declared in the act of 1901 that one of the acts repealed and intended to be supplied thereby is the act of June 25, 1895, P. L. 299. That act forbade any person to place in any waters of Pennsylvania any torpedo, giant powder, etc., or any other poisonous or explosive substances "for the purpose of catching or taking fish." The omission of the quoted words from the clause of sec. 26 of the act of 1901 relating to the specific act of placing such substances in the waters of the Commonwealth is significant. A consideration of this omission in connection with the express mention of the exceptional circumstances in which they may be placed in such waters dispels reasonable doubt that the omission was intentional; and this is a conclusive reason why the courts should not add a qualification to the prohibition which the Legislature deliberately discarded in revising the law upon the subject. Upon comparison of the 26th sec. of the act of 1901 with the act of 1895, which it supplies and supersedes, it will be seen that the former is much broader in its scope than the latter. It prohibits, first, the use of certain substances for the purpose of catching or taking fish, but as that would not fully accomplish the object the legislature had in view, there was added a provision against an act with respect to the same substances, which, though not committed with the specific purpose of taking or catching fish, would be destructive of them.

We cannot agree that this construction of the section brings it into conflict with sec. 3, art. 3 of the constitution. In determining whether an act contains more than one subject, regard must be had to the object to be attained. The constitution does not require every end and means necessary or convenient for the accomplishment of one general object to be provided for by a separate act relating to that alone. Provisions, though numerous and diverse,

which immediately lead to the accomplishment of that object are cognate to the subject of legislation and therefore form part thereof; *Road in Phoenixville*, 109 Pa. 44; *Commonwealth vs. Jones*, 4 Pa. Superior Ct. 362; *Commonwealth vs. Kenny*, 32 Pa. Superior Ct. and cases therein cited. The subject must be clearly expressed in the title, but, as has been declared repeatedly, it is not required by this constitutional provision that the title be a complete index to the contents of the bill, for this would make legislation too difficult and bring it into constant danger of being declared void. If the title expresses the subject so fully and clearly as to give notice of the legislative purpose to those who may be interested therein, and in the specification of the means whereby the general object of the act is to be attained is not deceptive or misleading, it will, in general be sufficient. The title of the act in question gives notice that the legislation is not confined to wasteful fishing nor to the regulation of fishing, both of which branches of the general subject are mentioned, but that it relates also to the encouragement of the propagation of food and game fish generally, to the encouragement and regulation of the artificial propagation of them by the State Fish Commissioners, and to the distribution of the same in the waters of the Commonwealth. True, the title does not specify the measures adopted to encourage the propagation of food and game fish, but it is a matter of common knowledge that to prevent the pollution of the waters they inhabit by poisonous substances would tend directly, and as effectively as any measure that can be suggested, to the accomplishment of the object to be attained. Any one reading the title, and having regard to the subject of legislation expressed therein, would naturally be led to suppose that the act might, and probably would, contain some provision against an act so plainly inimical to the propagation and protection of game and food fish that inhabit the waters of the Commonwealth. To hold that the title is invalid because it does not particularly specify this provision would not be sustained by the interpretation of section 3, art. 3 of the constitution which has been generally recognized and followed heretofore or which is necessary to the accomplishment of the beneficial purposes for which the constitutional provision was adopted. We are of opinion that the title is sufficient, and that the act does not contain more than one subject within the meaning of the constitution.

Upon the question of the interpretation of the word "place" the learned judge below expresses the opinion that it "is to have its ordinary signification, implying a direct act or an act from which a result would directly flow." If by this is meant that the poisonous substances must pass directly from the hand of the accused or his agent or servant into the stream, we cannot assent to this interpretation of the word. It may be safely assumed, and we so hold, that it contemplates not every negligent or inadvertent act no matter how remote, but an intentional act proximately connected with the introduction of the poisonous substances into the stream. But in proving the commission of the prohibited act it is not necessary to prove that the accused was impelled thereto by an evil motive to destroy the fish. Intent and motive are two different things, and it is a general rule of frequent application that a sane man is presumed to intend the necessary or the natural and

probable consequences of his voluntary acts. If one, though engaged in a lawful business, intentionally, and with ability to foresee the result, discharges poisonous substances employed in his business in such a manner and in such close proximity to a stream inhabited by game or food fish that in the ordinary course of things such poisonous substances must and do flow into the stream, the tribunal trying the case would be justified in inferring that he intended the necessary or the natural and probable consequences of his act, and hence that his act was a placing of poisonous substances in the stream within the true intent and meaning of this section of the statute; and this too although his primary purpose was not to take or destroy the fish inhabiting the stream.

It follows from the foregoing construction of the section that the court erred in holding that the facts alleged by the Commonwealth as above recited, and the legitimate inferences, which in the absence of explanation or countervailing testimony could be drawn therefrom, would be insufficient to sustain a conviction. Therefore the motion to quash the proceedings before the justice of the peace should have been overruled and the case heard upon such evidence as the Commonwealth and the defendant saw fit to adduce. The record must be remitted for the purpose of a hearing in accordance with the foregoing suggestion.

The order is reversed and set aside, and the record remitted with a procedendo.

MORRISON, J. dissents.

FISH BASKET WITHOUT A LICENSE.

Two men were arrested in Bradford County for fishing an eel basket without a license. They were convicted before a Justice of the Peace and took an appeal to Court which was afterwards stricken off. The defendants claiming to have been misled by the Act of Assembly were permitted to sue out of a writ of certiorari. They set up as a defence that there was no penalty for taking eels, under the act of April 27, 1903, P. L. 319. As this had been ruled on by the Superior Court, the Court dismissed the exceptions and sustained the judgment of the magistrate.

The following is the opinion of the Court:

Commonwealth vs. Mahlon Johnson Richard Hainsworth:	In the Court of Quarter Sessions of Bradford County. Charge, Illegal Fishing.
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An appeal was taken in this case without allowance by the Court which was subsequently stricken off. The parties claiming to have been misled by the Act of Assembly, were permitted to sue out a writ of certiorari. After the filing of additional exceptions and several continuances, the matter was taken up for argument. The defendants were each convicted before the magistrate as charged in the complaint, the finding being as follows: "And now, October 5, 1905, after hearing the sworn proofs, allegations and arguments of counsel, the defendants are each convicted of fishing with an il-

legally constructed fish basket with wing walls, and without a license for the same in the Chemung river of the public waters of this Commonwealth in Bradford County, Pennsylvania, on September 26, 1905, and did illegally catch eels on said date and place therewith, all as set forth in the complaint in this case in violations of Sections 1 and 2 of the Act of April 27, 1903, P. L. 319." Each defendant was sentenced to pay a fine of \$25, costs, &c.

The following exceptions were filed:

First. The Justice did not have the jurisdiction of the parties defendant, as the record does not show that they were brought into Court by any legal process, or any process whatever.

Second. The record of the Justice purports to show that the defendants were convicted and sentenced for violations of Sections one and two of the Act of April 27, 1903, P. L. 319: whereas there is no penalty prescribed under these sections for catching eels; therefore the Justice had no jurisdiction to try, convict and pass sentence upon the defendants.

Third. There is no penalty prescribed by Section two of the Act of May 29, 1901, P. L. 302 for catching eels.

Later, the following additional exceptions were filed:

The said defendants further except to said proceedings in that the commission of the said Shoemaker is defective and gives him no authority to arrest in the County of Bradford. That he acted without authority in making the arrest of the said defendants and therefore the Justice did not have the jurisdiction to hear and determine the said cause.

There is no penalty imposed for the taking of eels, and that the defendants are not charged with fishing or attempting to fish for anything except eels.

The principal contention of the defendants is embodied in the second, third and last additional exceptions, it being asserted that no penalty is provided for non-observance of, or non-compliance with the sections referred to. The record does not show that anything except eels were caught, but this would not under the decided cases justify defendants. They were fishing, as found by the magistrate, with a device not permitted by law, an illegal construction. The basket described in the complaint did not meet legal requirements in that it was made of wire screens with small meshes, and with only a part of the bottom movable. The fact that fish other than those designated as game and food fish were caught, would not relieve the defendants from liability. In Commonwealth vs. Geo. Kenny and H. J. Humma, 32 Superior Court Report, it was said, "To admit the use of an unlawful device, and at the same time contend that the act was not violated because the fish taken were not of the species of game and food fish, is not consistent with the doctrine of the decided case." Defendants were convicted of fishing with an illegally constructed basket and without a license. This was not allowable under the permissive act of 1903, the requirements not having been complied with and as held in Com. vs. Seacrist, 27 Superior Court Report 423, punishable under the act of May 29, 1901, P. L. 302. Under the authorities cited, we think

this conviction must be sustained. The remaining exceptions relate to the alleged illegality of the arrest. These, as shown by the record, are without merit. And now, March 18, 1907, for the reasons above given are more fully set forth in an opinion filed March 16, 1907, in the case of Com. vs. J. E. Allen involving the same questions, the exceptions are hereby dismissed.

By the Court,

A. C. FANNING, P. J.

Opinion filed April 3, 1907.

The Court alluded to the opinion given in the case of J. E. Allen wherein the Court went more fully into the law and rulings of the Upper Court. After the Court dismissed the case against Allen the defendant's counsel took an appeal to the Superior Court where it is now pending having been argued.

Commonwealth } In the Court of Quarter Sessions of Bradford County.
vs. }
J. E. Allen } No.

ILLEGAL FISHING.

An appeal was taken in this case without allowance by the Court which was subsequently stricken off. The parties claiming to have been misled by the Act of Assembly were permitted to sue out a writ of certiorari. After the filing of additional exceptions and several continuances, the matter was taken up for argument.

By Act of Assembly, the catching of eels is made lawful by the use of fish baskets provided, inter alia, "That every basket so used shall be made of slats, not less than one-half inch apart, with a movable bottom, which shall be taken out of each basket, so used, at sunrise, and be kept out until sunset."

The complaint avers that the defendant, at the County of Bradford on certain dates, in the Chemung River of the public waters of this Commonwealth did * * * Unlawfully fish with a fish basket and wing walls in the said waters, and did use and operate the said fish basket for the taking of eels, and did therewith actually catch one or more eels, the said fish basket being illegally and unlawfully constructed and not in accordance with the requirements of the law, the same having, in the place of slats, and movable bottom, wire screen of very small meshes, to wit, about one-half inch square, and part of said bottoms even as described being solid and immovable, all contrary to section one of the act of April 27, 1903, P. L. 319. Of this offense, the defendant, after hearing was convicted and sentenced to pay a fine of \$25 and costs of prosecution.

The exceptions filed are as follows:

First. The Justice did not have the jurisdiction of the parties defendants, as the record does not show that the parties were brought into Court by any legal process, or any process whatever.

Second. The record of the Justice purports to show, that the defendants were convicted and sentenced for violation of Sections one and two, of the Act of April 27, 1903, P. L. 319; Whereas there

is no penalty prescribed under these sections for catching eels; therefore the Justice did not have jurisdiction to try, convict and pass sentence upon the defendants.

Third. There is no penalty prescribed by Section two of the Act of May 29, 1901, P. L. 302, for catching eels.

The additional exceptions are as follows:

The said defendant further excepts to said proceedings in that the commission of W. E. Shoemaker is defective and gives him no authority to arrest in the County of Bradford. That he acted without authority in making the arrest of the said defendant, and therefore the Justice did not have jurisdiction to hear and determine the said cause. That there is no penalty imposed for taking of eels and that the defendant is not charged with fishing or attempting to fish for anything except eels.

The first exception is untenable for the reason that the record shows that the defendant appeared in Court; that the complaint was read to him; that informalities of issuing warrant were waived by the attorney, a date fixed for hearing by agreement, at which time he appeared with counsel and the case was heard with the result stated. The defendant is in no position to object that he was not brought into court by regular process.

One of the additional exceptions is to the effect that the commission of W. E. Shoemaker is defective and gives him no authority to make arrests in the County of Bradford. There is nothing on the record to warrant the Court in so holding. Furthermore, after the waiver made, and the hearing at which he voluntarily appeared, the want of authority in Mr. Shoemaker to make the arrest would not be ground for setting aside these proceedings.

The remaining exceptions are to the effect that there is no penalty prescribed for catching eels. It is true, as contended by counsel, that the penalty prescribed by Section 2 of the Act of 1901 for the illegal taking of game and food fish, cannot be imposed for the unlawful capture of eels, they not being designated or classified as such. The Acts of Assembly declare in what manner fish may be taken from the waters of this Commonwealth, and the use of any other method, device or appliance for that purpose is unlawful. Such is the interpretation given to our Acts of Assembly by the Superior Court of this state. Comm. vs. Seacrist, 27 Superior Court Report 423. Comm. vs. Geo. Kenny and H. J. Humma, 32 Superior Court Report. In the latter case fishing with several lines attached to umbrella bows by means of which suckers only were caught, was held to be unauthorized and punishable. It was there said, "To admit the use of an unlawful device and at the same time contend that the act was not violated because the fish taken were not of the species of game or food fish, is not consistent with the doctrine of the decided case." The first section of the act of April 27, 1903, permits the catching of eels between August 25th and December 1st, subject to certain conditions, by means of fish baskets with wing walls, and every basket used to be made of slats not less than one-half inch apart, and with movable bottoms. In the case at bar, it appears that the bottom was constructed of wire screens with small meshes instead of slats and in part immovable. It was a

trap for every kind of fish that came down the stream. The requirements of the act authorizing the use of fish baskets had not, as found by the magistrate, been complied with, therefore, fishing with this illegally constructed device was unlawful and the defendant thereby subjected himself to the fine imposed. This conclusion is warranted by Comm. vs. Seacrist, Supra. There the defendant was convicted of using a fish basket without taking out its bottom at sunrise and keeping it out until sunset, and for using the same without having taken out a license, and in the disposition of the case by the appellate Court, the basket was characterized as "an illegal construction not warranted by any statute and violative of the provisions of the act of May 29, 1901, P. L. 302." It was also stated "No penalty is fixed for the violation of the provisions of this act of 1903, but none is necessary inasmuch as the whole appliance or device would be an unlawful construction and punishable under the act of 1901, unless the terms of the act of 1903 were observed. Eels may be caught in a basket only when the kind of basket defined in the act is used and when the prescribed license is procured."

In the case last cited, as in the one at bar, the magistrate imposed a fine of \$25, and it was held "that the judgment was entered and sentence imposed in strict conformity with Section 38 of the act of May 29, 1901, P. L. 302. * * The complaint was a specific charge of maintaining and using a fish basket, a device not permitted by and being contrary to law."

The cases cited, as we understand them, are decisive of the question here raised, and binding upon the lower court, Comm. vs. Seacrist, Supra. was followed in Comm. vs. Shupp, 32 C. C. R. 178 by Terry, P. J., in a well considered opinion, and a fine of \$25 imposed for using an illegally constructed fish basket.

And now, March 16, 1907, the exceptions are hereby dismissed.

By the Court,

A. C. FANNING, P. J.

FISH BASKETS MUST CONFORM TO THE ACT.

T. B. Lucky was convicted before a Justice of the Peace in Monroe County for having a fish basket which did not comply with the act. The defendant appealed to the Court under the act of 1905 granting the defendant the right to appeal to the Court of Quarter Sessions. The Commonwealth asked that the appeal be stricken off on the ground that the act of 1905 was unconstitutional, it having been so declared by several County Courts.

Judge Staples took the other side and declared the act to be constitutional when the Commonwealth excepted.

In the Superior Court to which the appeal was taken it was decided that the act of 1905 was unconstitutional and the case was sent back to Monroe County Court. Under the ruling of the Superior Court the Lower Court quashed the appeal taken under the act of 1905 but granting an appeal nunc pro tunc in the following opinion:

Commonwealth
vs.
T. B. Lucky } In the Court of Quarter Sessions of the Peace of
Monroe County.
Of December Term, 1905.
No. 15.

Opinion.

In accordance with the opinion of Mr. Justice Porter of the Supreme Court in the above case, appealed to said Court to No. 6 January Term, 1907 it is our duty to quash the appeal taken in the same, for the reason that the said appellate court has decided the Act of April 22, 1905, P. L. 284, giving to the defendant upon conviction in the case of summary conviction the right of appeal to the Court of Quarter Sessions of the Peace without an allocatur is unconstitutional. Mr. Justice Porter in his opinion stated that it was unconstitutional for two reasons. First, that by Article V, Section 14 of the constitution of the State of Pennsylvania, the right of the defendant in a case of summary conviction to appeal was restricted and could only be allowed by an appellate court. Second, that the said act offended against Article III, Section 3 of the constitution, in that the title of the same did not clearly express its subject. It is not the province of this court to criticize the opinion of the highest court, nor would it serve any good purpose in the present case, because the court below is in full accord with the second reason given as to the unconstitutionality of the Act. If this phase of the case had been brought to the attention of the Court by counsel for the appellant at the argument, or thereafter, it would have so held, but it was not in any way called to the court's attention. It is immaterial whether the act is unconstitutional or not, as to the other phase, and if there were nothing more in the case, the appeal would be quashed. The defendant, however, on the 11th day of November, 1905, presented a petition to this court for an allowance of appeal nunc pro tunc upon which petition a rule to show cause was granted, and on the 15th day of October, 1906, a petition for leave to amend the original petition was presented to said court, upon which also a rule to show cause was granted. Therefore, under these petitions, is the defendant entitled to an appeal nunc pro tunc?

Under the provisions of the act of April 17, 1876, P. L. 29, this petition for the appeal should have been presented and allowed within five days after judgment of the justice of the peace. No petition having been presented within that time, and no appeal having been allowed, has the defendant shown such cause as would entitle him to an appeal nunc pro tunc? It is contended by the Commonwealth that his failure to have the appeal allowed within five days should prevent the allowance of the appeal nunc pro tunc. The defendant in his petition, in the opinion of the court, gives such an explanation or excuse for his failure to take the appeal within the five days as would be sufficient to allow the appeal nunc pro tunc if good cause for the same be shown in other matters. The defendant, taking it for granted that he had the right to proceed under the act of April 22, 1905, P. L. 284 took his appeal as a matter of right, without an allowance by the appellate court. As it appears he was misled by the act, the same practically having

been declared unconstitutional by the Superior Court. It is not a case where the defendant simply alleged ignorance of his right, but where he and his counsel were misled by an act of Assembly. It would be unfair to deny him an appeal in this case, because it was only natural for him to have been misled, the court itself having adopted the view that the defendant had the right of appeal, of course, under said act. The court taking this view of the matter as to the time, does there appear among the records and the petition, sufficient cause to allow the appeal? Considering the case relative to this phase of it, in connection with the evidence reported by the justice of the peace, the petition and the amended petition, the court is of the opinion that sufficient cause is shown. The defendant specifically denies the facts upon which the justice founded his judgment, and if he should convince the court by testimony, upon the trial of the case, of the facts alleged by him in his amended petition, it would feel constrained to acquit him of the offense charged. Without commenting upon the manner in which Justices of the Peace arrive at their opinions in cases of this kind, by reason of a lack of proper conception of their duty in the premises we feel that there was sufficient doubt in the case, under all the evidence as to the justness of the judgment of the justice of the peace.

And now, November 30, 1906, for the reasons above stated, the rule to show cause why the appeal should not be allowed nunc pro tunc is made absolute and appeal allowed.

By the Court,

C. B. STAPLES, P. J.

After the hearing of the appeal the Court announced that under the law as defined by the Superior Court the defendant was technically guilty, but goes on to say that in view of all the elements in the case he suspended sentence and directed that defendant be discharged on payment of the costs.

Commonwealth } In the Court of Quarter Sessions of the Peace
vs. } of Monroe County.
T. B. Luckey. } Of December Term, 1905, No. 15.
Summary Conviction.

Opinion and Judgment of the Court.

Under the law as defined by the Superior Court in the case of Commonwealth vs. Seacrist, 27 Super. 423, we find that the defendant was technically guilty of a violation of the Act of May 29, 1901, P. L. 302, and that the act of April 27, 1903, P. L. 319, which made it lawful to catch eels in the waters of this Commonwealth by the use of fish baskets with wing walls, by a person having a proper license therefor, did not permit the defendant to fish or use in the waters of this Commonwealth any other kind of a device or basket, or in any other manner than that provided for by said Act of 1903, and we state for the information of the public that the placing of a fish basket in any stream of this Commonwealth, the slats of which are not one-half inch apart while in said stream, and which fish basket does not have a movable bottom is every part or division of the same, and which movable bottom is not re-

moved between the hours of sunrise and sunset, violates the act of May 29, 1901, P. L. 302, and is liable to conviction and punishment for said violation. And we further hold that the placing of said fish baskets in the stream contrary to the provisions and regulations as above stated is a violation of the statute, whether the offender actually fishes with the basket or not. We make this statement so that the public may be informed of the provisions of the act as construed by this court and in the future, govern themselves accordingly.

Although we find the defendant guilty of a violation of the said act, we are of the opinion, after having heard all the testimony in the case that he was not wilfully a violator. He had taken out his license under the act of April 27, 1903, and was fully of the belief that he was not a violator of the law. The very fact of having applied and paid for a license to use a fish basket was an evidence of good faith, and since there has been such a difference of opinion among judges as to whether or not the use of fish baskets was a violation of the Act of May 29, 1901, laymen ought hardly to be responsible for their mistaken interpretation of the law.

Taking this view of the matter it is hereby ordered and directed that upon the payment of the costs in this case, the sentence be suspended and the defendant discharged, February 19, 1907.

By the Court,

C. B. STAPLES, P. J.

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END OF YEAR